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THE ESSENTIALS OF SMALLPOX VACCINATION.

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THE VACCINATION REACTION.

When potent vaccine virus is applied to the derma, irrespective of the method used for penetrating the epidermis, a reaction will take place, reaching a maximum which may be observed in from 1 to 10 days, depending on the degree of immunity of the subject. *Absence of this reaction indicates that the virus is incapable of protecting against smallpox, and not that the subject is immune.* Any one of the forms of this vaccination reaction, to be described below, is evidence of a successful vaccination.

If the subject has never been immunized by smallpox or by previous vaccination, the reaction will manifest itself as a primary *vaccinia*. A *papule* appears at the inoculation site on the third or fourth day following the vaccination. This becomes vesiculated on the next day, the *vesicle* being surrounded by a narrow red margin or *areola*. This vesicle increases in diameter at the rate of approximately a millimeter a day. About the seventh day, the skin outside the areola begins to turn red; and this *area* of redness rapidly extends until the ninth or tenth day, when the maximum diameters of vesicle and area are reached. After this day, the area rapidly fades and the vesicle becomes brown and crusted, though still surrounded for some days by a narrow areola. If kept dry, the *crust* will separate in approximately three weeks from the day of vaccination, leaving a red *scar*, which becomes white in several months. Accompanying the rapid development of the area (seventh to tenth days), the axillary lymph nodes are usually swollen and tender, and fever and headache are generally present. All these symptoms abate promptly when the maximum of the local reaction is reached.

If the subject retains some degree of immunity, either through previous vaccination or an attack of smallpox, the reaction will be accelerated in development, shortened in time, and decreased in severity. The *papule* will appear earlier, the *vesicle* will be smaller, and the area will be less extensive at the maximum of the reaction, which may occur at any time from the fourth to the eighth day. In this event the reaction is considered a *vaccinoid* (accelerated reaction, or secondary *vaccinia*).

If the immunity is very high, the acceleration may be so great that the reaction consists only of a papule and areola with the maximum diameter in from 12 to 60 hours after vaccination. In this case there is neither vesicle nor area, and the reaction is designated *reaction of immunity* (immediate reaction). The time element of this reaction is of prime importance. If the papule and areola do not appear until the third day and *there is no vesiculation*, the reaction is not that of immunity but is due to an impotent virus, and the vaccination should be repeated with a fresh lot.

NECESSITY FOR KEEPING VACCINE ON ICE.

The expiration date on a package of vaccine virus indicates its expectancy of potency under favorable conditions. Vaccine virus can not be kept too cold; it deteriorates rapidly even at room temperature. The freshest possible vaccine should be obtained; and this can be done by arranging for small and frequent shipments. The packages should be kept in water-tight containers in constant contact with ice. Large quantities may be placed in metal boxes, small quantities in fruit jars. For use in the field, large quantities should be transported in ice-cream freezers, small quantities in rubber-stoppered test tubes, packed with shaved ice in the inner compartments of vacuum bottles.

PREPARATION OF THE SITE FOR VACCINATION.

The skin of the upper arm in the region of the depression formed by the insertion of the deltoid muscle should be thoroughly cleansed with acetone on sterile gauze or cotton and wiped dry. Acetone is suggested as a cleansing agent rather than alcohol for the following reasons:

1. It is a more efficient cleanser.
2. It is cheaper.
3. It is not denatured with substances which may possibly affect the vaccination result.
4. It evaporates more rapidly.
5. Approximately 200 vaccinations recently performed after the use of acetone and alcohol on alternate subjects resulted in more successful vaccinations with acetone than with alcohol.

METHODS OF VACCINATING.

1. *The method of incision or linear abrasion.*—As practically all the packages of vaccine virus distributed in this country contain sterile needles, this is the method of choice for occasional vaccinations.

In each package of capillary tubes there will be found a perforated rubber bulb with a diaphragm across the interior of the neck. Push

an unbroken capillary tube through the neck of the bulb until about half of the capillary tube appears beyond the bulb. Break the tip which has been pushed through and withdraw the tube until the broken end lies in the neck of the bulb. With sterile gauze, break the other tip of the capillary tube and drop the contents on the spot to be vaccinated by squeezing the bulb with the finger over the perforation.

The underside of the arm is then grasped with the vaccinator's left hand, in order to stretch the skin where the virus has been dropped. This tension is maintained while the virus is being inserted. With the point of a sterile needle pressed through the drop of virus, "*a very slight scratch, not exceeding the eighth part of an inch*" (Jenner), is made down the arm. With the side of the needle or the flat end of a sterile toothpick, the virus is then gently rubbed across the scratch for at least 15 seconds.¹ The scratch should penetrate the epidermis, but not draw blood. The friction across the scratch may cause a slight oozing of blood-tinged serum, but this should not be sufficient to wash the virus out of the scratch.

2. *The drill method.*—In the drill method the epidermis is perforated by a small drill with a sharp cutting edge 2 mm. in width. The drill is made of carbon steel and the tip can be sterilized without affecting the temper of the cutting edge by dipping into alcohol and burning off the surface. The drill method is preferable for the rapid vaccination of large groups, because of the uniformity of perforation of the epidermis, which results in the maximum exposure of the derma to the virus with the minimum resulting lesion. The method is particularly advantageous where vaccine in vials can be used.

If in capillary tubes the virus is prepared for insertion as previously described, but is not dropped on the skin until after the derma has been exposed. The skin is tightly drawn and the drill pressed against it perpendicularly. A single rotary turn is then made without altering the pressure. This will detach a small flake of epidermis, which should be brushed off with the edge of the drill. This exposes a circle of derma about 2 mm. in diameter and, if skillfully done, should cause no bleeding. The virus is dropped on this circle of exposed derma and rubbed in with a sterile toothpick, as described under the method of incision.

If the number of persons being vaccinated is large enough to warrant the expenditure of all the virus in a vial vaccine container at one clinic period, the vaccine may be transferred directly to the arm with the sterile toothpick.

¹ This recommendation is based on the results of a series of tests with different viruses.

NUMBER OF INSERTIONS.

Multiple insertions should be used under the following conditions:

1. In case of exposure to smallpox.
2. In case of failure of previous vaccinations.
3. In case there is any doubt as to the full potency of the virus on account of possible adverse conditions of transportation or storage.
4. In case the subject is not likely to return for revaccination in the event of failure.

When multiple insertions are used, they should be made not less than 2.5 cm. apart. A capillary tube should be used to each insertion.

PRECAUTIONS.

The vaccination site should not be exposed to direct sunlight until dry. *Dressings are unnecessary and are harmful if permitted to remain on the arm.* The small vesicles produced by either of the above methods are reasonably tough and will dry without rupturing unless macerated by the excessive heat and moisture present under a vaccination shield or other nonmobile covering. This maceration is not prevented by the presence of openings in the vaccination shield.

All vaccinations should be observed at the end of 7 and 11 days, and revaccinations should, in addition, be observed after 48 hours, in order to detect a possible reaction of immunity. *The vaccination of persons who have been exposed to smallpox should be considered successful as soon as this reaction of immunity appears.* Reporting for observation may, however, be more readily insured by attaching a small piece of adhesive tape, stamped with the observation date below the vaccinated area.

Small insertions are insisted upon because the diameter of the lesion is dependent upon the amount of epithelium removed, and the rapidity of healing is dependent upon the size of the lesion.

THE VACCINATION CERTIFICATE.

The result of the vaccination should be indicated on the vaccination certificate by noting the day of greatest extent of redness. This may be done conveniently by checking the day on the following diagram:

	Reaction of im- munity.			Vaccinoid.				Vaccinia.			
Days.....	1	2	3	4	5	6	7	8	9	10	11

Encircle the number of the day after vaccination on which the greatest extent of redness was observed.

The number of successful insertions, the lot number of the virus, and the expiration date should also appear on the certificate.

SMALLPOX IN TWENTY STATES, 1915-1920.

By JOHN N. FORCE, Special Expert, and JAMES P. LEAKE, Surgeon, United States Public Health Service.

The increase in the prevalence of smallpox in the United States during recent years has been marked and definite. The accompanying table and figures were prepared, abstracts of the vaccination laws and regulations were made, and correspondence was carried on with the State health officers in order to determine the geographical distribution of this increase and its relation to vaccination, especially of school children.

The data were secured for 19 States and the District of Columbia. It is realized that other States have as accurate statistics on smallpox as do these 20 (the District of Columbia being considered as a State); but in view of the differences in reporting, only those were included which have reported cases of smallpox for each year from 1915 to 1920, inclusive, according to the tables published in the Public Health Reports.

The population estimates for the intercensal years were made by the usual method of successively subtracting one-tenth of the intercensal increase from the 1920 census figures. The number of cases was obtained from the annual morbidity tables in the Public Health Reports, with the exception of the 1920 figures, which were obtained personally from the Division of Sanitary Reports and Statistics, United States Public Health Service.

The average rate for each State was obtained by the formula

$$R = \frac{1,000 T}{6 P - 15 D}$$

in which T represents the total number of cases for the six-year period, P the 1920 population, D the annual increase (one-tenth of the intercensal difference), and R the rate per thousand of population. The annual and average rates for groups of States were similarly obtained. The States, listed in ascending order of average rates, are as follows:

New York.....	0.026	Virginia.....	0.68
New Jersey.....	.027	Michigan.....	.82
Connecticut.....	.09	Ohio.....	.96
Maryland.....	.10	Wisconsin.....	1.01
District of Columbia.....	.14	Minnesota.....	1.18
South Carolina.....	.22	Mississippi.....	1.36
Vermont.....	.28	Indiana.....	1.40
California.....	.44	Oregon.....	1.48
Louisiana.....	.54	Washington.....	1.72
Alabama.....	.55	Kansas.....	2.00

A glance at Figure 1, obtained by plotting the annual rates in the groups of States indicated in Table I, shows two interesting tendencies. The first of these is the remarkably constant low rate in the Eastern States. At no point does the curve vary strikingly from the average rate of 0.04. The curves for the Central and Southern States, in spite of fluctuations, show a decided upward

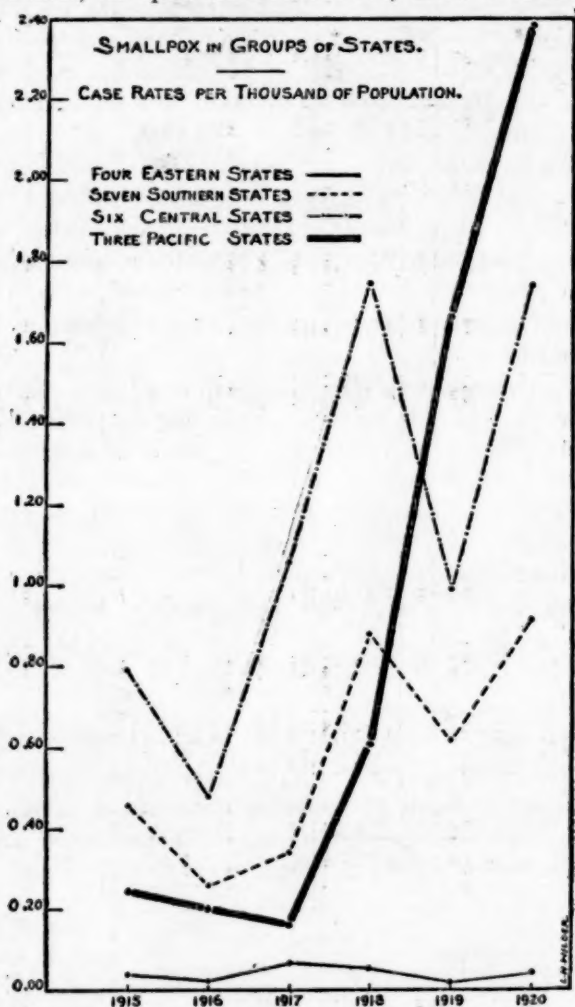


FIG. 1.

tendency, though the Central States maintain a level almost twice as high as that of the Southern States. The second interesting tendency is the extraordinary increase of smallpox on the Pacific coast, an increase which has carried the curve from 0.16 to 2.38 during the last three years and converted an average rate (0.2) comparing favorably with that of the Eastern States to one (1.6) in excess of that of the central group.

TABLE I.—Smallpox in twenty States: Cases and case rates per thousand of population, 1915–1920, inclusive.

State.	Population.		1915		1916		1917		1918		1919		1920		Average case rates, 1915–1920, inclusive.
	1920	Increase, 1910–1920.	Cases.	Rate.	Cases.	Rate.	Cases.	Rate.	Cases.	Rate.	Cases.	Rate.	Cases.	Rate.	
Connecticut.....	1,380,631	265,875	22	0.02	175	0.14	423	0.32	94	0.07	6	0.00	2	0.00	0.09
New Jersey.....	3,155,900	618,733	152	.05	9	.00	6	.00	65	.02	109	.04	149	.05	.027
New York.....	10,384,829	1,271,215	155	.02	30	.00	333	.03	534	.05	191	.02	307	.03	.025
Vermont.....	352,428	—3,528	214	.60	152	.43	66	.19	55	.16	5	.01	104	.30	.28
Total for 4 Eastern States.....	.....	.....	543	.04	395	.02	828	.06	749	.05	311	.02	563	.04	.04
Alabama.....	2,348,174	210,081	775	.34	157	.07	636	.28	3,047	1.58	935	.40	1,394	.59	.55
District of Columbia.....	437,571	106,502	15	.04	4	.01	11	.03	48	.12	173	.41	89	.20	.14
Louisiana.....	1,798,509	142,121	330	.20	819	.47	835	.48	950	.54	1,226	.69	1,594	.87	.64
Maryland.....	1,449,061	154,315	94	.07	69	.05	98	.07	219	.15	229	.16	167	.12	.10
Mississippi.....	1,790,618	—6,486	2,461	1.37	1,401	.78	1,530	.85	3,601	2.01	2,502	1.40	3,148	1.78	1.36
South Carolina.....	1,683,724	168,324	394	.24	93	.06	114	.07	214	.13	304	.18	1,077	.64	.22
Virginia.....	2,309,187	247,575	1,067	.50	399	.18	726	.32	1,605	.71	1,972	.86	3,468	1.50	.63
Total for 7 Southern States.....	.....	.....	5,196	.46	2,942	.26	3,930	.34	10,284	.88	7,341	.62	10,907	.92	.58
Indiana.....	2,980,390	229,514	3,459	1.23	1,158	.41	5,563	1.90	5,582	1.93	3,833	1.33	5,775	1.97	1.41
Kansas.....	1,769,257	78,308	2,861	1.65	2,085	1.20	2,623	1.50	7,130	4.00	2,437	1.38	3,900	2.20	2.00
Michigan.....	3,608,412	888,299	918	.27	1,355	.40	2,929	.85	4,417	1.26	2,460	.68	4,845	1.32	.82
Minnesota.....	2,387,125	311,417	1,708	.76	1,270	.56	2,718	1.18	2,252	.97	2,448	1.04	5,895	2.46	1.18
Ohio.....	5,759,394	992,473	3,221	.61	1,921	.36	5,242	.96	10,227	1.82	4,107	.73	7,139	1.24	.96
Wisconsin.....	2,632,067	298,207	1,817	.73	887	.35	1,250	.49	2,592	1.01	3,288	1.28	5,608	2.16	1.01
Total for 6 Central States.....	.....	.....	13,981	.79	8,696	.48	19,355	1.06	32,200	1.75	18,573	.99	33,242	1.74	1.14
California.....	3,426,861	1,040,312	336	.12	234	.08	329	.11	1,059	.33	2,002	.60	4,474	1.30	.44
Oregon.....	783,389	110,624	579	.79	119	.16	122	.16	493	.65	2,629	3.40	2,765	3.53	1.48
Washington.....	1,356,621	214,631	254	.20	637	.50	390	.30	1,076	.80	5,300	3.29	6,027	4.44	1.72
Total for 3 Pacific States.....	.....	.....	1,199	.24	990	.20	841	.16	3,238	.61	9,021	1.06	13,266	2.38	.91

These tendencies will be better appreciated after a consideration of the curves for the individual States comprising the groups. Figure 2 presents these curves arranged in order of their average rates. It will be necessary, however, to interpret these curves in terms of the status of vaccination in the respective States. The following statements are based on the State laws and regulations published annually in reprints from and supplements to the Public Health Reports, confirmed in each instance by correspondence with the State health officers. The quotations are from this correspondence. Without the helpful comments of these officials the interpretation of the rates in terms of the published laws would not have been possible.

Following the name of each State below are the average, the maximum, and the minimum rate per thousand of population for the years 1915 to 1920, inclusive.

1. NEW YORK.

Average rate per 1,000 population	0.026
Maximum rate .....	.05
Minimum rate .....	.003

The law provides that vaccination shall be a condition of school attendance in cities of the first and second classes and in other parts of the State when smallpox has been declared epidemic by the State commissioner of health. The cost of vaccination directed by local health authorities is a charge on the municipality. It is estimated that 100 per cent of school children are vaccinated in the first and second class cities; and in a canvass of 1,400 school children outside these cities 28 per cent were found to be vaccinated.

The sanitary code provides that smallpox contacts must be vaccinated within 3 days following exposure or be quarantined for 20 days. There is little evidence of hostility toward vaccination.

2. NEW JERSEY.

Average rate per 1,000 population	0.027
Maximum rate .....	.05
Minimum rate .....	.002

The law provides that boards of education may prohibit the school attendance of any unvaccinated child. This prohibition is consistently enforced in some of the cities, and in others only in the presence of smallpox. The low rate is believed to be due to this enforcement as well as to vaccination campaigns instituted by the State department of health in communities where smallpox appears. These campaigns generally produce good results, as high as 80 per cent of the entire community being vaccinated in some instances.

3. CONNECTICUT.

Average rate per 1,000 population	0.09
Maximum rate .....	.32
Minimum rate .....	.001

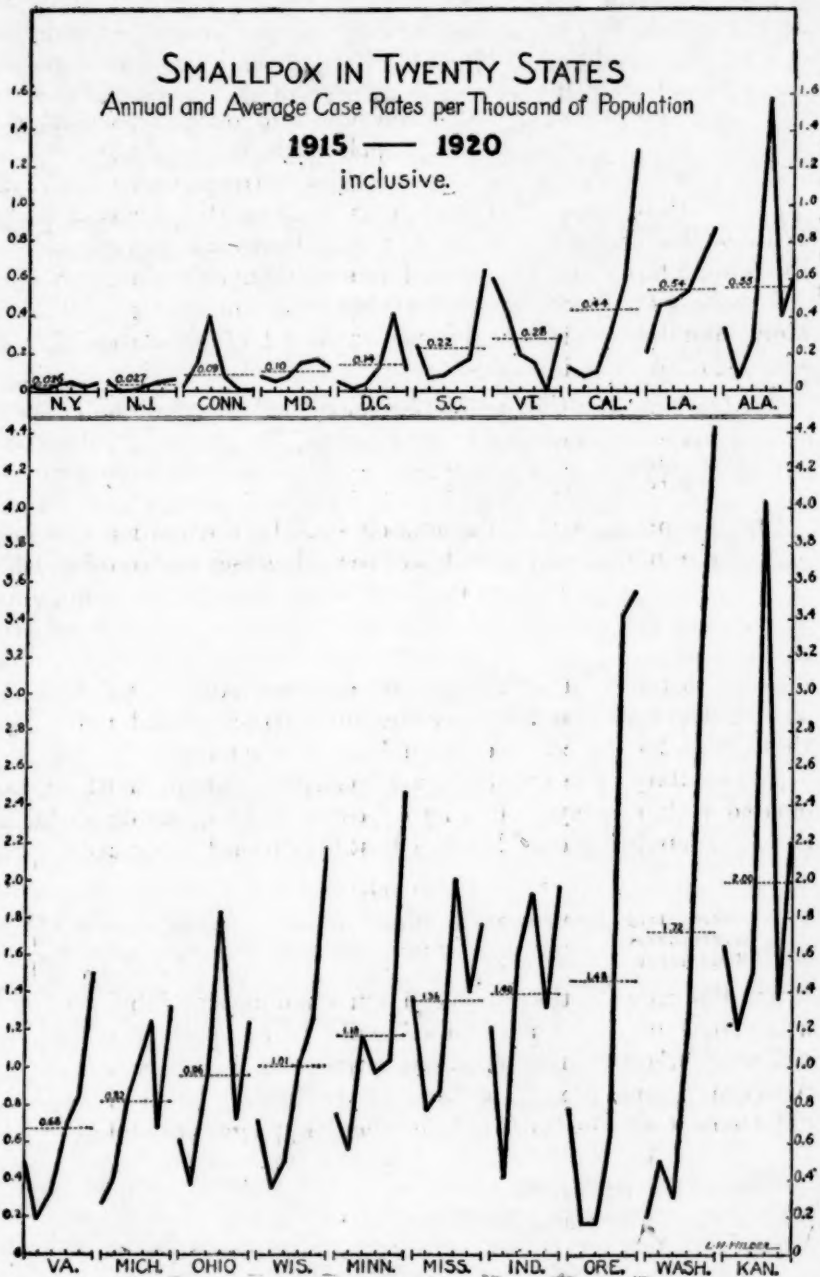


FIG. 2.

The law provides that boards of education may require vaccination as a condition of school attendance. This law does not apply to private schools and is only sporadically carried out in communities under 75,000 population. Boards of health may provide at public expense for a general vaccination to prevent the introduction or to arrest the spread of smallpox. Persons refusing to be vaccinated when ordered by local health authorities are subject to fine.

The attitude of the citizens of the State is favorable toward vaccination, and in every instance where smallpox has appeared and vaccination has been urged there has been little opposition to it.

4. MARYLAND.

Average rate per 1,000 population.....	0.10
Maximum rate.....	.16
Minimum rate.....	.05

The law provides that every physician shall vaccinate all children in his practice within one year after birth. No teacher shall receive any unvaccinated child into school. "There is a small tendency to evasion of this law; indifference is shown now and then; and there is opposition which can be dignified as popular. These disturbances are small, local, and do not count heavily against the immunization of Maryland school children." Private schools are sometimes negligent of vaccination. The low rate is believed to be due to the vaccination law.

5. DISTRICT OF COLUMBIA.

Average rate per 1,000 population.....	0.14
Maximum rate.....	.41
Minimum rate.....	.01

The law provides that no child shall be admitted into the public schools who shall not have been duly vaccinated or otherwise protected against smallpox. Persons exposed to smallpox must be vaccinated or stand prosecution in the court. All persons in the District must be vaccinated whenever the commissioners of the District make proclamation that such action is necessary for the public health. The commissioners are authorized to provide free vaccination. The general attitude of the people is favorable toward vaccination.

6. SOUTH CAROLINA.

Average rate per 1,000 population.....	0.22
Maximum rate.....	.64
Minimum rate.....	.06

The law provides that councils of incorporated cities and towns may pass ordinances requiring the vaccination of all citizens and fixing penalties for failure to comply. The State board of health has the power to supervise vaccination in these cities and to make regulations for the vaccination of persons in unincorporated territory. In case of the failure of a city to pass a vaccination ordinance, the State board of health shall promulgate vaccination regulations

for that city and, in case of danger from smallpox, shall enforce such regulations at the expense of the city. The law further provides that no school authority shall admit a child who has not been vaccinated in accordance with the local ordinance or regulations of the State board of health. These regulations provide for vaccination during the first, sixth, and fifteenth years of age, and after exposure to smallpox.

The State health officer estimated that nearly 100 per cent of school children in cities are vaccinated, and 80 per cent in rural districts. The attitude of the citizens is favorable, and there is very little trouble in enforcing vaccination in the presence of smallpox. Reliance is placed on vaccination rather than on quarantine. The State distributed 183,000 tubes of free vaccine virus during the six months ending March 31, 1921. The fee for vaccination is fixed by law at 10 cents.

7. VERMONT.

Average rate per 1,000 population.....	0.28
Maximum rate.....	.60
Minimum rate.....	.01

Vermont has the highest average rate in the group of Eastern States, being also higher than three States of the southern group. The rate for Vermont is approximately seven times the average rate for its group.

The law provides that the health officer shall furnish virus approved by the State board of health, and during the existence of smallpox in a town shall provide thorough and safe vaccination of all persons who may need the same. It has been impossible to obtain a compulsory vaccination law in the State on account of organized opposition. During smallpox epidemics, unvaccinated children are excluded from school and free vaccination is offered. In times of epidemic the citizens seem willing to be vaccinated.

8. CALIFORNIA.

Average rate per 1,000 population.....	0.44
Maximum rate.....	1.30
Minimum rate.....	.08

Previous to 1911, California had a law providing for the vaccination of children as a condition of school entrance. In that year a new law was passed exempting children whose parents filed with the school authorities a certificate of opposition to the practice of vaccination. The law further provides that school authorities shall keep forms for these certificates on hand for the use of parents. The effect of this law has been to build up a population group of school children only 15 to 20 per cent vaccinated. The great increase of smallpox in the State in the last three years has been due to the presence of this group of nonimmune persons.¹

¹ For further discussion of this singular law see Epidemiological Study of Smallpox in California. By John N. Force. *Am. Jour. Pub. Health*, 1921, 11, 119.

The regulations of the State board of health provide that contacts shall be quarantined for 12 days or be vaccinated and kept under observation until evidence of immunity (vaccinia, vaccinoid, or reaction of immunity) is secured.

General free vaccination clinics are held by the State board in communities where smallpox appears, and, since unvaccinated children are excluded from school during a smallpox epidemic, the number of vaccinated school children has been increased to 80 per cent in these circumstances, thus showing that the true conscientious objectors constitute only 20 per cent of the parents. An attempt to prevent the exclusion of unvaccinated school children in time of epidemics of smallpox, by abolishing vaccination as a condition of school entrance, was defeated at the last election by a substantial majority.

9. LOUISIANA.

Average rate per 1,000 population.....	0.54
Maximum rate.....	.57
Minimum rate.....	.20

The law provides that vaccination of public school children is required only in parishes where smallpox has been declared to be prevalent, but, in addition, a majority of the board of health must recommend such compulsory vaccination. Contacts shall be vaccinated or shall submit to domiciliary quarantine. Nothing in the act shall be construed to render vaccination compulsory. The citizens are hostile or indifferent toward vaccination rather than favorable. "It is for this reason that the regulations read as they do."

10. ALABAMA.

Average rate per 1,000 population.....	0.55
Maximum rate.....	1.58
Minimum rate.....	.07

Under the law, county boards of education have the right to require vaccination as a prerequisite for school attendance, but "there is no such thing as compulsory vaccination in Alabama." The State registrar estimates that about 25 per cent of the population over 6 years of age have been vaccinated.¹ The citizens are indifferent except during an epidemic, when there is little difficulty in securing practically universal vaccination of the affected locality. The law provides for the isolation in their homes of contacts until successfully vaccinated.

11. VIRGINIA.

Average rate per 1,000 population.....	0.68
Maximum rate.....	1.50
Minimum rate.....	.18

¹ Under date of June 29, 1921, the State health officer estimated that between 30 and 40 per cent of the children over seven years of age were vaccinated. He also stated that the reported incidence of smallpox is probably unreliable except that for the last three years.

The law provides that every child entering school must present a certificate of successful vaccination, but this requirement may be suspended by the school board of any city or county. Councils and boards of supervisors may cause persons in their jurisdiction to be vaccinated when occasion requires. The population of the larger cities, it is stated, is very well vaccinated, and most of the smallpox arises in the rural sections, where compulsory vaccination can not be enforced because of the strong sentiment against it.

12. MICHIGAN.

Average rate per 1,000 population.....	0.82
Maximum rate.....	1.32
Minimum rate.....	.27

The law provides that health officers may offer free vaccination to every child not previously vaccinated and to all other persons who have not been vaccinated within the preceding five years. Since the law is permissive, not mandatory, vaccination can not be made a condition precedent to school attendance in the absence of smallpox in the community. If a case develops in school, the school is "closed for the vaccination of the children, and they are not permitted to return until successfully vaccinated; and in the event that they refuse vaccination, they are quarantined 16 days." Contacts are either vaccinated and observed for 16 days or, if vaccination is refused, are quarantined for 16 days.

The general attitude toward vaccination is one of indifference in most communities. In some communities there has been considerable opposition, which usually succumbs to the alternative of quarantine.

13. OHIO.

Average rate per 1,000 population.....	0.96
Maximum rate.....	1.82
Minimum rate.....	.36

The law provides that boards of health may take measures to provide for, and offer inducements and facilities for, gratuitous vaccination. Boards of education may make and enforce rules and regulations to secure the vaccination of, and prevent the spread of smallpox among, pupils attending schools in their districts.

The State health officer believes that vaccination is being well enforced in the schools of most of the large cities and has been generally practiced in a number of country districts where smallpox has prevailed during the past few years.

There is an open and vigorous organized opposition to vaccination throughout the State.

14. WISCONSIN.

Average rate per 1,000 population.....	1.01
Maximum rate.....	2.16
Minimum rate.....	.35

The law provides that local boards of health may prohibit the school attendance of unvaccinated children for 25 days after the appearance of smallpox in the community. Free vaccination of children may also be provided during an epidemic of smallpox. About 50 per cent of the children of school age are estimated to be vaccinated. The opposition to vaccination in late years has been very strong. The assembly recently passed, by a vote of 46 to 27, a bill repealing the statutory provision requiring vaccination as a condition of school attendance.

15. MINNESOTA.

Average rate per 1,000 population.....	1.18
Maximum rate.....	2.46
Minimum rate.....	.56

The law provides, that no rule shall compel the vaccination of any child, or shall exclude, except during epidemics of smallpox, a child from the public schools for the reason that such child has not been vaccinated. During epidemics of smallpox unvaccinated children must be excluded for three weeks or until vaccinated. Contacts refusing vaccination shall be isolated for 21 days. It is estimated that two-thirds of the children of school age have never been vaccinated. There is much opposition to vaccination and violent quarrels when attempts are made to exclude unvaccinated children from school. In many places the people are indifferent on account of the present mild character of the disease.

16. MISSISSIPPI.

Average rate per 1,000 population.....	1.36
Maximum rate.....	2.01
Minimum rate.....	.78

The law provides that supervisors in counties where smallpox exists are empowered to pass ordinances to provide for compulsory vaccination. If the State can not furnish vaccine, it shall be a charge on the county.

17. INDIANA.

Average rate per 1,000 population.....	1.41
Maximum rate.....	1.97
Minimum rate.....	.41

It is lawful for health officers to order compulsory vaccination of school children upon pain of exclusion from school. The State board of health, however, advises health officers not to make such orders on account of the opposition created. Contacts are quarantined 14 days unless submitting to vaccination.

18. OREGON.

Average rate per 1,000 population.....	1.48
Maximum rate.....	3.53
Minimum rate.....	.16

The law provides that school boards may prohibit attendance of any unvaccinated child. "There has been more or less slackness in regard to this law. Many school boards have failed to prohibit the attendance of unvaccinated children." When smallpox exists in a community, the regulations of the State board of health provide for the exclusion of unvaccinated school children.

19. WASHINGTON.

Average rate per 1,000 population.....	1.72
Maximum rate.....	4.44
Minimum rate.....	.20

The smallpox rate in Washington rose from 0.30 in 1917 to 4.44 in 1920, the highest rate in any of the 20 States considered. Previous to 1919, a law was in force enabling school directors to require vaccination as a condition of school attendance. This act was repealed in 1919. Contacts are vaccinated or quarantined for 16 days. Free vaccination is offered when smallpox exists in a community.

20. KANSAS.

Average rate per 1,000 population.....	2.00
Maximum rate.....	4.00
Minimum rate.....	1.20

Kansas has the highest average rate of the 20 States considered, being separated from the other members of the central group by two of the Pacific States.

The rules of the State board of health provide that unvaccinated children shall be excluded from school for 25 days after the appearance of smallpox in a community. There is no compulsory vaccination. Contacts shall be quarantined for 21 days unless successfully vaccinated. Even in some progressive districts, approximately 80 per cent of the school children have not been vaccinated.

Conclusions.

From a study of these statistics and procedures, it is evident that smallpox in this country is dependent on the popular vote. In general, the people obey laws which they have made. If popular sentiment in a State is behind a strong centralized compulsory vaccination act, smallpox is negligible in that State. If local authorities are given discretionary powers in the matter of vaccination enforcement, the rate tends to rise, even in the most favored sections of the country, whereas in the absence of compulsory features in the law, or where there is no law at all, smallpox reaches a high rate.

A CONSIDERATION OF ARSPHENAMINE AND CERTAIN OTHER ORGANIC ARSENIC COMPOUNDS USED IN THE TREATMENT OF SYPHILIS.¹

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The organic arsenic compound arspenamine, formerly known as "salvarsan," which is used so extensively in the treatment of syphilis to-day, was discovered by Ehrlich and Bertheim in 1910, after many painstaking and systematic researches, it being the 606th compound which they synthesized. The advent of arspenamine into therapeutics, therefore, was in no way accidental, but was the result of methodical chemical and biological study.

The treatment of syphilis by means of arsenic was not new when arspenamine was originated, arsenic in the inorganic form having been used intermittently since the time of Fallopius. In order to comprehend clearly the nature of the better known antisyphilitic agents containing organic arsenic as their main active constituent, I shall briefly sketch their chemical relationships without attempting, however, to arrange the compounds with any strict reference to the chronological order of their introduction.

Leaving out of consideration, therefore, the inorganic compounds of arsenic represented by the highly toxic trivalent compounds of arsenious acid and the less toxic pentavalent compounds of arsenic acid, we can satisfactorily arrange most of the antisyphilitic agents containing arsenic as their main active constituent into three groups, namely, (a) the cacodylates, (b) the arsanilates, and (c) the arsenobenzols, all of which contain arsenic in the organic form.

(a) *Cacodylates*.—The cacodylates are aliphatic compounds containing arsenic in the pentavalent form and are close derivatives of arsenic acid.

By substituting two methyl groups for two hydroxyl groups in arsenic acid, cacodylic acid is formed; and by further substitution of sodium for the hydrogen of the remaining hydroxyl group, one obtains sodium cacodylate.

Another closely related salt of cacodylic acid, which differs from sodium cacodylate in having one of its methyl groups replaced by an NaO group, was introduced into therapeutics as "arrhenal."

Mention should perhaps be made at this point of the recently introduced homologue of cacodylic acid, namely, disodium ethyl arsonate, which appears under the trade name of "mon-arsone." This homologue differs from "arrhenal" in having the methyl group of the latter substance replaced by an ethyl group.

¹ Address delivered at the quarterly conference of clinic directors and physicians, Boston, Mass., Apr. 13, 1921.

The relation of these compounds to arsenic acid and to each other may be seen from the following structural formulæ:

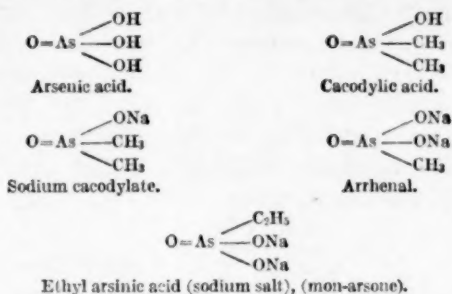


CHART 1.

The announcement by Ehrlich in 1910 that arsphenamine was curative in syphilis, led Murphy, a well-known clinician,² who was unable to secure Ehrlich's remedy, to try sodium cacodylate for this disease. He was surprised to find that excellent results were obtained with sodium cacodylate in healing primary chancres and certain other manifestations of syphilis. The cacodylates immediately met with favor in the United States in the treatment of syphilis, and in spite of later evidence that their popularity was unjustified, they are still used in certain quarters as antisypilitic agents.

The effects of the cacodylates are considered to be due principally to the partial reduction of these compounds in the body; but since the reduction occurs slowly, the toxic effects are not pronounced. A large percentage of the cacodylate compounds is eliminated unchanged. The amount which may be reduced varies in different individuals and conditions, so that the cacodylates may not always act as harmless agents.

Comparative tests made with certain of the cacodylates and arsphenamine show that the cacodylates are decidedly inferior to arsphenamine, both in experimental syphilis and in human cases. As regards the homologue of cacodylic acid, disodium ethyl arsonate or "mon-arsone," little can as yet be stated with certainty. The clinical reports of its use in syphilis, though on the whole favorable to the compound, are still too meager to permit one to state positively whether it will rank with arsphenamine as an effective anti-syphilitic agent; but, as in the case of the cacodylates, the results in experimental syphilis have been disappointing.

(b) *Arsanilates*.—The arsanilates differ from the cacodylates in being aromatic type derivatives of arsenic acid, and are made by

² Murphy, J. B. Jour. Am. Med. Assoc., 1910, vol. 55, p. 1113.

combining arsenic acid with aniline in the presence of an alkali. They may be regarded as close chemical forerunners of arsphenamine. Although Béchamp in 1860 found that aniline and arsenic acid could be combined, it remained for Ehrlich and Bertheim in 1907 to determine the true nature of the compound and to establish it as being arsanilic acid. The sodium salt of arsanilic acid, sodium arsanilate, was introduced as an especially nontoxic agent for the treatment of syphilis under the name of "atoxyl."

Sodium acetyl arsanilate, a compound closely allied to "atoxyl," was introduced as "arsacetin."

The structures of the above-described arsanilates are given below:

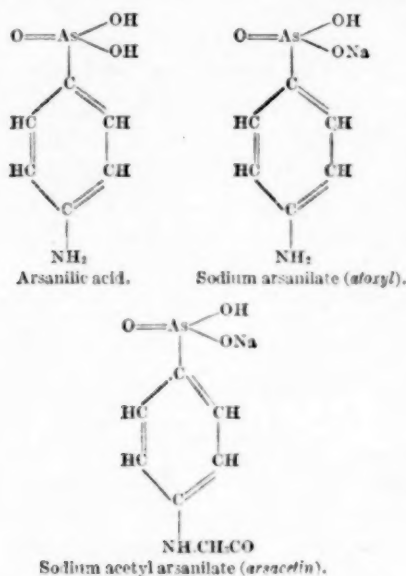
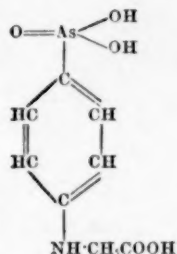


CHART 2.

"Atoxyl" proved to be of considerable value in the treatment of syphilis; but, after thorough trial, it was found to be much more toxic than it was first supposed to be, causing permanent blindness in a considerable number of instances. Ehrlich found that "atoxyl" had no effect on trypanosomes outside of the body and, hence, explained its effects in syphilis by its reduction in the body, from the pentavalent to the trivalent form. The decomposition products, however, have never been isolated. It is decomposed very readily in the gastro-intestinal tract, forming more toxic products; therefore it is not given by mouth.

"Arsacetin" was found to be quite dangerous and no more effective than "atoxyl" in syphilis.

The explanation given by Ehrlich to account for the parasiticial action of "atoxyl," namely, that it was reduced from the comparatively inactive pentavalent to the more active trivalent form, led him to study other aromatic arsenic compounds in which the arsenic is trivalent.



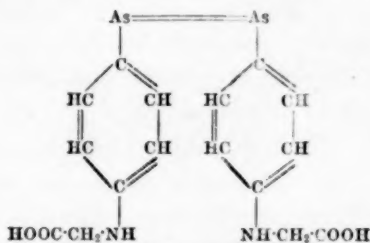
Phenyl glycine p arsinic acid.

CHART 3.

His investigation led to the discovery of phenyl glycine p arsinic acid. Chemically phenyl glycine p arsinic acid is an important derivative of arsanilic acid and is distinguished from "atoxyl" mainly by its decreased toxicity.

(c) *Arsenobenzols*.—Phenyl glycine p arsinic acid, on reduction with sodium hydrosulphite, yields arseno phenyl p glycine, a trivalent compound which is very important from the standpoint of therapeutics, and which represents the third or arsenobenzol type. In this type two arsenic atoms are linked together by a double bond, and each to the benzol nucleus by a single linkage.

The relation of arseno phenyl p glycine to arspenamine is very close, as seen from its structure given below:



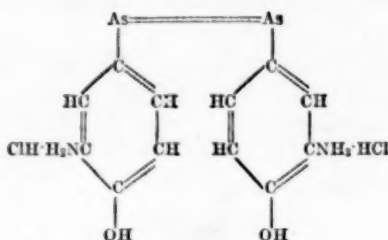
Arseno phenyl p glycine.

CHART 4.

Arseno phenyl p glycine was found by Ehrlich to have a marked influence on the course of relapsing fever in mice. Its sodium salt, sodium arseno phenyl p glycinate, 418 in Ehrlich's series, appeared under the name of "spirasyl."

By varying and changing the position and kind of sidechains, Ehrlich found that the most beneficial results were obtained, not

only in mice infected with relapsing fever but in human syphilis, with the dihydrochloride of 3.3' diamino, 4.4' dihydroxy arseno-benzene, 606 in Ehrlich's series, or "salvarsan," now known officially as arsphenamine.

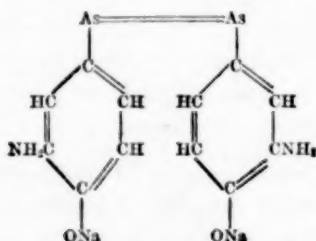


Arsphenamine.

CHART 5. 5

Ehrlich considered that this compound embodied the virtues which a compound that was to be used in syphilis should have, namely, a marked parasiticial action with little or no deleterious action on the host. All previous compounds which possessed parasiticial properties were also quite destructive to the host, so that in arsphenamine Ehrlich's desires seemed to be realized.

Aqueous solutions of arsphenamine are quite strongly acid and should not be used in therapeutics on account of their high toxicity. For this reason, arsphenamine should always be properly alkalized before its administration. The disodium salt of arsphenamine which is thus formed upon the addition of the proper amount of sodium hydroxide, is less stable than arsphenamine and, hence, was not considered as a commercial possibility until quite recently. The commercial product now appears under the official name of sodium arsphenamine (1206 of Ehrlich's series). Although it can be prepared for administration by the simple addition of water, and in this respect is treated like neoarsphenamine, it should be administered according to the rules formulated for arsphenamine. Structurally, it is essentially the same as arsphenamine.

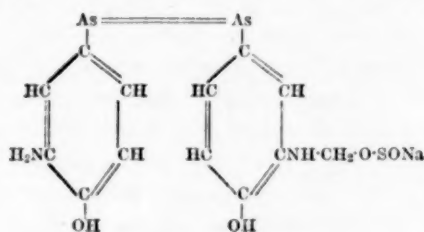


Sodium arsphenamine.

CHART 6.

The discovery that arsphenamine possessed marked parasitocidal properties led Ehrlich to the further investigation of various derivatives of arsenobenzol, and, in seeking to obtain a preparation which could be used clinically without preliminary treatment with an alkali, he discovered that by treating arsphenamine with sodium formaldehyde sulphonylate the following condensation product was formed, namely, sodium, 3,3'-diamino-4,4'-dihydroxy-arseno-benzene-N-methylene sulphinate.

This product is known as 914 in Ehrlich's series, and, later, was given the name of "neosalvarsan." It is now known officially in the United States as neoarsphenamine. The following structure has been generally assigned to it, perhaps without sufficient evidence:



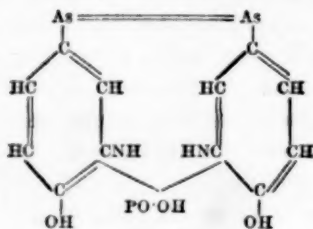
Neoarsphenamine.

CHART 7.

The curative properties of neoarsphenamine in syphilis need not be mentioned, except to say that it seems to be the leading arsenical to-day in the treatment of this disease.

Since the advent of arsphenamine and neoarsphenamine into therapeutics, a great amount of research has been directed toward improving these compounds of the arsenobenzol type, and, as a result, many new compounds have been discovered. None of these newer compounds, however, has supplanted, nor has even closely rivaled, arsephenamine and neoarsphenamine in favor. After numerous investigations the Treasury Department of the Federal Government officially recognized by license only two compounds in addition to arsphenamine, sodium arsphenamine, and neoarsphenamine. The first of these additional compounds is an arsphenamine derivative containing phosphorus, and is 4,4' dihydroxy arsenobenzene 3,3' phosphamic acid (No. 1116 of Mouneyrat's series). It is licensed under the official name of phospharsenamine,

its trade name being "galyl." Its structure is given by Morgan,³ as follows:

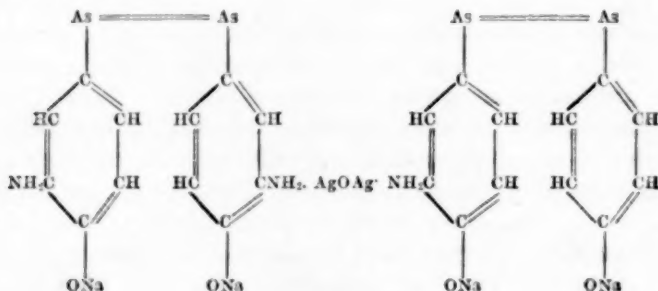


Phospharsenamine (galyl.).

CHART 8.

Phospharsenamine is an acidic substance, insoluble in water, and dissolves in aqueous sodium carbonate. It is put up in sealed ampules containing the dry sodium carbonate, so that it will readily dissolve upon the addition of water. Solutions made in this way are yellow, or greenish yellow, the greenish color rapidly deepening upon standing.

The second additional compound is an arsphenamine derivative containing silver. Its chemical composition is not definitely known. It is officially known as silver arsphenamine, and is thought to have the following structure:



Silver arsphenamine.

CHART 9.

Silver arsphenamine dissolves readily in water, forming a black or brownish-black solution. Both the phosphorus and silver compound of arsphenamine are considered to be improvements over arsphenamine; but as they have been but recently officially licensed by the Federal Government, adequate clinical reports of their use in this country are unavailable at present. Both are enjoying considerable reputation abroad.

In conjunction with the official name, arsphenamine appears in the United States under the trade names of "salvarsan," "arseno-

³ Morgan, Gilbert T., *Organic Compounds of Arsenic and Antimony*. 1913.

benzol," "diarsenol," and "arsaminol"; sodium arsphenamine as "sodium diarsenol" and "salvarsan sodium"; neoarsphenamine as "neosalvarsan," "neodiarsenol," and "neoarsaminol"; silver arsphenamine as "silver salvarsan" and "silver diarsenol," and finally, phospharsenamine as "galyt."⁴

The behavior, both inside and outside of the body, of compounds of the arsenobenzol type used in the treatment of syphilis, is of extreme interest and also of great practical importance, since they are used so extensively in the disease. Unfortunately, too little is known concerning their chemical nature and their behavior in the organism. In making this last statement I do not wish to disparage the work of Ehrlich and his coworkers. Their names will undoubtedly always be associated with the greatest of epochs in the history of therapeutic agents. However, when one considers that the vast amount of work which has already been done has not given us even a chemical method for determining a toxic from a non-toxic preparation of arsphenamine, we can the more readily realize that much is still to be learned regarding this active type of compounds.

During the past few years I have had the opportunity, in the Hygienic Laboratory of the United States Public Health Service, of examining for toxicity over 2,000 samples of arsphenamine and neoarsphenamine, and in this manner I have been permitted to observe the behavior of these compounds, both *in vitro* and *in vivo*, under carefully controlled conditions. As a result of these observations certain studies were made and certain data compiled which were of value in conducting the biological tests required by the Federal Government before these compounds could be sold in interstate traffic. The clinical bearing of these studies will be obvious from the description of the several experiments which appear later in this paper.

The official method for testing arsphenamine requires that white rats weighing from 100 to 150 grams should tolerate per kilo of body weight, 100 mgm. of the drug for 48 hours when given intravenously as a 2 per cent alkaline aqueous solution, 0.9 c.c. of normal sodium hydroxide being used to alkalinize 100 mgm. of arsphenamine. Neoarsphenamine is also required to be tested in white rats, the dose to be tolerated for 7 days being 200 mgm. per kilo when given intravenously as a 4 per cent aqueous solution. The rate of injection must be 12 to 15 seconds for each 0.1 c.c. of either solution.

One of the first observations, which has been repeatedly confirmed during the past three years, is that there is a quite marked individual susceptibility in animals to both arsphenamine and neoarsphenamine. An extreme instance is illustrated by reference to some experiments

⁴ Solutions of each of the licensed arsphenamines, put in hermetically sealed glass ampules, appear commercially as solutions of arsphenamine.

on rabbits (Roth, 1918, Hyg. Lab. Bulletin No. 113). In working with a sample of arsphenamine which killed 75 per cent at 100 mgm. per kilo and 50 per cent of the rabbits at 80 mgm. per kilo within two weeks, an animal was found which tolerated 175 mgm. per kilo for one month. Quite similar results were obtained with neoarsphenamine on rats.

The impression was early obtained that arsphenamine and neoarsphenamine were not as similar in action as they are usually thought to be, many clinicians even at the present time, regarding neoarsphenamine merely as arsphenamine in a form convenient for administration. The following observations demonstrate that arsphenamine and neoarsphenamine are quite unlike biologically.

As stated above, according to the official regulations, the maximal tolerated dose of arsphenamine must be 100 mgm., and for neoarsphenamine, 200 mgm. per kilo when given to white rats intravenously. These dosages are not far below the minimal lethal dose of perhaps the majority of preparations. Now, when these compounds are administered to rats in the official dosage, the time of death of the animals treated with arsphenamine is totally unlike that observed after administration of neoarsphenamine.

Statistics compiled from the above official tests showed that after administration of arsphenamine a little over 80 per cent of the rats which died within 14 days died within 24 hours after administration, and that almost 90 per cent died within 48 hours; whereas the rats which received neoarsphenamine rarely died within the first day, and the majority died after the third day. The time of death is shown in the following table:

Total number dying:	Per cent.
Within the first day.....	5
Within the first two days.....	15
Within the first three days.....	30
Within the first four days.....	60
Within the first five days.....	(about) 75

The following additional differences were observed:

(a) Neoarsphenamine rarely causes immediate symptoms in rats, whereas arsphenamine usually causes pronounced depression in the standard test doses.

(b) Rats injected intravenously with neoarsphenamine bleed profusely, whereas those injected with arsphenamine bleed but little, thus showing a difference in the effect on the coagulability of blood *in vivo*.

(c) The necropsy findings in arsphenamine-treated rats usually show marked pulmonary changes and slight kidney changes, whereas those dying from neoarsphenamine show marked degenerative

changes in the kidney and relatively slight pulmonary changes. These differences are so constant that one can almost always tell from the necropsy findings what substance was administered.

(d) Arsphenamine was found to be relatively more stable than neoarsphenamine, the latter being frequently described in the laboratory as the more "tricky" compound of the two.

It was previously stated that acid solutions of arsphenamine were observed to be much more toxic than solutions properly alkalized, so that failure to alkalize may give rise to very disastrous results. This was pointed out by Ehrlich in his early studies. Strange to say, there are certain clinicians who still give unalkalized solutions of arsphenamine. Studies made on rats showed conclusively that arsphenamine in acid solution is at least two to four times as toxic as a solution made alkaline with the proper amount of sodium hydroxide. If the arsphenamine is given as a dilute acid solution, it is less toxic than when given in concentrated solution. This fact may account for the apparent nontoxicity of acid solutions reported by certain clinicians. It was further shown in experiments with white rats that a properly alkalized solution of arsphenamine is slightly less toxic as a 0.5 per cent than as a 2 per cent aqueous alkaline solution.

In our earliest experiments at the Hygienic Laboratory the method advocated by Ehrlich was followed in alkalizing arsphenamine; that is, a 15 per cent solution of sodium hydroxide was added to the aqueous solution of arsphenamine, drop by drop, until the precipitate which formed was redissolved. An additional drop or two of the 15 per cent sodium hydroxide solution was then added before making the alkalized arsphenamine up to the desired concentration. Such solutions were shown to be relatively unstable in air, becoming turbid within a half hour in many cases. It has been shown by others that solutions alkalized according to the method of Ehrlich are more prone to produce reactions clinically than those made more alkaline. By using Ehrlich's method, the monosodium salt of arsphenamine is mainly formed, whereas when using one-third more alkali than is required to clear the solutions of the precipitate which forms, the disodium salt is formed.

That a solution of arsphenamine consisting mainly of the monosodium salt is more toxic than a solution of the disodium salt has been confirmed in experiments which we have carried out on rats. The details of these experiments appear in Table I. The addition of 0.65 to 0.7 c. c. normal sodium hydroxide per 100 mgm. of arsphenamine mainly forms the monosodium salt, 0.9 c. c., the disodium salt.

TABLE I.—*The influence of the degree of alkalization of arsphenamine on toxicity in white rats when given intravenously as a 2 per cent alkaline aqueous solution. (Inadequately and adequately alkalized solutions were injected alternately.)¹*

Group.	Inadequate alkalization.				Adequate alkalization.			
	0.65 to 0.7 c. c. normal sodium hydroxide per 100 mgm. of arsphenamine.				0.9 c. c. normal sodium hydroxide per 100 mgm. of arsphenamine.			
	Number injected.	Number died within 48 hours.	Number died within 14 days.	Number lived 14 days.	Number injected.	Number died within 48 hours.	Number died within 14 days.	Number lived 14 days.
AA.....	5	4	4	1	5	0	0	5
BB.....	5	5	5	0	5	2	3	2
CC.....	5	2	2	3	5	0	0	5
DD.....	5	4	4	1	5	1	1	4
EE.....	5	4	4	1	5	1	1	4
FF.....	5	5	5	0	5	3	3	2
Total.....	30	24	24	6	30	7	8	22
Per cent.....		80	80	20		22	27	73

¹ Animals received 100 mgm. per kilo.

² Two were pregnant.

It will be noticed that in our experiments both the monosodium and disodium salt are made with normal sodium hydroxide (about 4 per cent) instead of using the 15 per cent solution as advocated by Ehrlich. However, the underlying principle affecting the two methods is the same. In fact, many clinicians to-day rationally use various strengths of sodium hydroxide solution. They ascertain by trial that it requires a certain amount of a sodium hydroxide solution to clear a certain amount of arsphenamine solution. To the arsphenamine solution thus cleared one-third more alkali is added, thus forming the disodium salt.⁵

The quality of the sodium hydroxide used in alkalizing arsphenamine was also found to have a distinct influence on toxicity in white rats; none but pure sodium hydroxide should be used. Unfortunately it is very difficult generally to obtain sodium hydroxide which is free from impurities. We have lately encountered a so-called "chemically pure" sodium hydroxide, which, when made up as a normal solution, deposited, after standing several days, a considerable amount of a light-brown gelatinous material. No chemical examination was made of this material, but experiments on rats showed that arsphenamine alkalized with the bottom portion of the sodium hydroxide solution containing the deposit was considerably more toxic than a solution made alkaline with the top or clear portion of the sodium hydroxide solution. Details of the experiment appear in Table II.

⁵ The Surgeon General of the United States Public Health Service has advised the use of 0.9 c. c. of normal sodium hydroxide (approximately 4 per cent) for each 0.1 gram of drug (Reprint No. 529 from Public Health Reports), since it has been shown that this amount will form the disodium salt, regardless of the brand of commercial arsphenamine used.

TABLE II.—*The effect on toxicity of alkalinizing arsphenamine with a solution of sodium hydroxide containing sediment as shown by its intravenous administration to white rats as a 2 per cent aqueous solution.*

Sample of arsphenamine.	A. Arsphenamine alkalinized with <i>top</i> portion of <i>clear</i> sodium hydroxide solution containing no gelatinous material. ¹				B. Arsphenamine alkalinized with <i>bottom</i> portion of sodium hydroxide solution containing gelatinous material. ¹			
	Number injected.	Number died within 48 hours.	Number died within 14 days.	Number lived 14 days.	Number injected.	Number died within 48 hours.	Number died within 14 days.	Number lived 14 days.
Land B.....	5	2	2	3	5	3	3	2
D R L.....	5	0	0	5	5	2	3	2
M.....	5	0	1	4	5	2	3	2
Total.....	15	2	3	12	15	7	9	6
Per cent.....		13	20	80		47	60	40

¹ A and B were made from the same sodium hydroxide solution. These arsphenamine solutions were injected alternately in each group of 10 rats, in dosage of 100 mgm. per kilo.

The influence of rate of injection on toxicity of properly alkalinized solutions of arsphenamine was ascertained in both rats and guinea pigs, and it was shown that with certain lots increasing the rate of injection increased the toxicity in both species, the effects being more marked in guinea pigs than in rats.

The effect of increasing the rate of injection in the guinea pig was shown not only by the above-mentioned increase in mortality, but by the additional observation that all guinea pigs receiving the solution rapidly were more greatly depressed immediately after the injection than those injected slowly. The results of the experiments in rats are shown in Table III.

TABLE III.—*Influence of the rate of injection of arsphenamine in white rats when given intravenously as a 2 per cent alkaline aqueous solution. (Alternately injected at rapid and slow rate. Animals received 100 mgm. per kilo.)*

Group.	Rapid injection.				Slow injection.			
	Number injected.	Number died within 48 hours.	Number died within 14 days.	Number lived 14 days.	Number injected.	Number died within 48 hours.	Number died within 14 days.	Number lived 14 days.
A X.....	5	4	4	1	5	1	2	3
B X.....	5	3	3	2	5	2	4	1
C X.....	5	2	3	2	5	1	1	4
D X.....	5	2	2	3	5	0	0	5
E X.....	5	2	2	3	5	3	3	2
Total.....	25	13	14	11	25	7	10	15
Per cent.....		52	56	44		28	40	60

Arsphenamine in alkaline solution is generally regarded as a very unstable substance, and the probability of a change in toxicity occurring while in solution previous to its administration must be considered in investigations dealing with the toxicity of arsphenamine. Ehrlich (*Soziale Kultur und Volkswohlfahrt*, 1913) found that arsphenamine in solution (presumably alkaline) increased in toxicity so rapidly that after six hours its toxicity was more than doubled, the increase in toxicity being attributed to the formation of 3-amino-4-hydroxy-phenyl-arsenoxide, or so-called "arsenoxide." However, it was shown in the Hygienic Laboratory (Roth, 1918, Hygienic Lab. Bull. No. 113) that an aqueous alkaline solution of arsphenamine could be kept in a glass cylinder in which only a small surface was exposed to the air, for at least five hours without any increase in toxicity. Since these experiments were reported, some striking data have been collected which demonstrate clearly that alkaline solutions of arsphenamine may at first decrease slightly in toxicity on standing, provided only a small amount of surface is exposed to the air.

Tabulations made of the time of death in each set of five rats used in the official testing of all arsphenamine from three different manufacturers received during a period of one year, showed that when tested in the official manner, at the dosage of 100 mgm. per kilo, the first rat of the set was more likely to die than any of the others, and that the collective mortality was much less in the fifth rat than in the first. In other words, during the conduct of the test there was a gradual decrease in the toxicity of alkaline arsphenamine solution when exposure to the air was relatively slight, as was the case in these tests, the only surface exposed being that permitted by a 10 c. c. glass cylinder having a diameter of about 13 mm. Table IV shows the collective results in detail. Only those sets were included in which not more than 4 nor less than 1 rat died in each set. The time elapsing between the injection of the first rat and the completed injection of the fifth rat averaged about 20 minutes.

TABLE IV.—*Time of death of the rats in each set of 5 rats used in the official testing of arsphenamine. (Sets in which not less than 1 nor more than 4 died in each set.)*

Manufacturer.	Number of sets injected.	Dose in mgm. per kilo.	Total number died within 48 hours, in order of their injection.				
			1	2	3	4	5
M.....	41	100	34	22	17	9	13
A.....	55	100	25	16	17	13	10
D.....	34	100	19	11	5	2	5
Total.....	130		78	49	39	24	28
Per cent died, based on total number of deaths.....			36	22	18	11	13

It is noted that the first rat of each set of five is almost three times more likely to die than is the fifth; two times more likely to die than the third; and about 1.6 times more likely to die than the second.⁶

The shaking of aqueous alkaline solutions of arsphenamine and aqueous solutions of neoarsphenamine in the presence of air was found to materially increase the toxicity of solutions of each compound.⁷ For example, shaking a 4 per cent aqueous solution of high-grade neoarsphenamine in the presence of air for one minute will convert it into a dangerous solution; that is, instead of being tolerated in rats in dosage of 420 mgm. per kilo for 7 days, as was the case when not shaken, it killed 40 per cent of the animals in dosage of 200 mgm. per kilo. If a border line preparation is used—that is, one which is tolerated by rats receiving the standard test dose of 200 mgm. per kilo but fails at a 20 per cent higher dosage—we find that shaking for 1 minute will cause it to kill every rat injected at the standard test dose.

Quite similar results were produced by shaking properly alkalized arsphenamine solutions for a similar period of time. The increase in toxicity is presumed to be due to the formation of the more toxic oxidation product, 3-amino-4-hydroxy-phenyl-arsenoxide more commonly called "arsenoxide," since air was found to be essential to the production of increased toxicity.

The keeping qualities of market samples of arsphenamine and neoarsphenamine while in sealed ampules were found to be wholly unlike. During the last two years numerous samples of arsphenamine and neoarsphenamine were submitted by clinicians to the Laboratory for reexamination. The reexamination failed to disclose any positive evidence of deterioration in the arsphenamines submitted, whereas a large number of the neoarsphenamine samples were shown to have deteriorated while in the ampule. It was found that certain lots of neoarsphenamine changed in sealed ampules, after an indefinite period, in (1) color, (2) mobility in ampule, (3) solubility, (4) toxicity, and (5) odor.

The change in color amounted in some instances to only a slight deepening of the original golden yellow color, while in other cases a change to a brick red occurred, such as takes place when the powder is exposed to the air for a day or more. The lots which showed marked changes in color were usually in the form of a solid, and therefore not freely mobile in ampule. The change in solubility

⁶ These experiments were completed before Dr. G. C. Lake of the Hygienic Laboratory had called my attention to this phenomenon.

Hunt (*Jour. Am. Med. Assoc.*, 1921, vol. 76, p. 854) observed this phenomenon in some alkaline solutions of arsphenamine, but not in others. The tabulation above indicates that it occurs in many if not all lots representing three commercial domestic products.

⁷ Reprint No. 612 from the Public Health Reports, vol. 35, No. 33, Sept. 17, 1920.

varied, as shown by their behavior when made up in 4 per cent aqueous solution, certain lots producing only a slightly turbid solution, others producing a fine flocculent, or coarse suspension. Filtration of the coarse suspension showed that only about 10 per cent of the material was soluble in water at room temperature within a half hour. This coarse suspension, as such, however, was not shown to be toxic for rats in all cases. Likewise, an increase in toxicity could not be demonstrated in each lot of neoarsphenamine which had undergone slight changes in solubility. Although we were unable to detect an increase in toxicity in certain lots of incompletely soluble or difficultly soluble neoarsphenamine, the samples submitted were reported to have produced very grave symptoms in man, and occasionally death, so that it would appear that relatively insoluble preparations should never be used clinically. These changes in neoarsphenamine are not confined to one product, but some products show them more frequently than others. Strangely, the changes in solubility do not bear any definite relation to the date of manufacture; in one instance a lot became insoluble within 48 hours after being tested at the factory. Experiments on incubating neoarsphenamine at 37° C. while in ampule, showed that solubility can be decreased in some lots by being held at 37° C. for about nine months. Such lots emit a rather strong garlicky odor on opening the ampule.

Controls kept at a temperature of 18–20° C. for a similar period were completely soluble in water when made up as a 4 per cent solution.

Summary.

The above observations on the behavior of arsphenamine and neoarsphenamine may be summarized as follows:

- (1) There is a well-marked individual variation in the susceptibility of animals to both arsphenamine and neoarsphenamine.
- (2) Neoarsphenamine is so unlike arsphenamine in its biological behavior that it should not be regarded as arsphenamine in a form convenient for administration.
- (3) Acid solutions of arsphenamine are at least two to four times as toxic as properly alkalinized solutions, the toxicity increasing directly with the concentration.
- (4) The toxicity of properly alkalinized solutions of arsphenamine is slightly less toxic as a 0.5 per cent than as a 2 per cent solution.
- (5) The Ehrlich method of alkalinizing arsphenamine, in which the monosodium salt is formed, produces a more toxic solution than the present method used in the United States, in which the disodium salt is formed.
- (6) The use of impure sodium hydroxide should be avoided in making arsphenamine solutions.

(7) Increasing the rate of injection of properly alkalized arsphenamine greatly increases its toxicity.

(8) Properly alkalized arsphenamine solutions in many cases are more highly toxic immediately after their preparation than after the lapse of about 20 minutes.

(9) Shaking alkaline aqueous solutions of arsphenamine and aqueous solutions of neoarsphenamine in the presence of air increases their toxicity markedly.

(10) Neoarsphenamine is a relatively unstable compound in sealed ampule and after an indefinite period may show changes in (1) color, (2) mobility in ampule, (3) solubility, (4) toxicity, and (5) odor.

(11) Difficultly or incompletely soluble preparations of neoarsphenamine may be highly toxic and should not be used clinically.

(12) In some cases neoarsphenamine in ampule may be rendered insoluble by incubation at 37° C. for about a year.

The above findings point out the importance of clearly distinguishing between what might be termed the "primary toxicity" of arsphenamine and allied compounds; that is, the toxicity as determined at laboratory examination, and the "secondary toxicity," or toxicity as influenced by such factors as the method of making the solution or the manner of administration.

In concluding, it should be borne in mind that the margin of safety between the therapeutic and lethal dose of arsphenamine, for example, is extremely narrow in man as compared with certain other potent agents, and that this extremely narrow margin of safety of itself makes it necessary to regard arsphenamine as a potentially dangerous therapeutic agent, even though every precaution is taken to handle it properly.

DIGEST OF COMMENTS ON THE PHARMACOPŒIA AND THE NATIONAL FORMULARY.

Review of Hygienic Laboratory Bulletin No. 129.

"Digest of Comments on the Pharmacopœia of the United States of America and on the National Formulary for the Calendar Year Ending December 31, 1919," is the title of Bulletin No. 129 issued by the Hygienic Laboratory, United States Public Health Service.

This bulletin is the fifteenth number of the series of Digest of Comments and, like the preceding numbers, it embodies a more or less complete review of the literature for the current year dealing with the items included in the two official drug standards of the United States of America, namely, the Pharmacopœia and the National Formulary. In addition to abstracts bearing directly on these two official works, comments having an indirect interest have

also been included, i. e., the more important comments on food and drug laws, poison laws, narcotic laws, drug inspection work, drug and plant cultivation, chemotherapy, and foreign pharmacopœias.

In view of the variety of the subjects covered, this bulletin should be of value, not only to those interested in the revision of the Pharmacopœia and the National Formulary, but to pharmacists and physicians in general, manufacturers of, and dealers in chemicals and pharmaceutical products, drug and food inspectors, chemists, pharmacognocists, and public health officials.

PREVALENCE OF POLIOMYELITIS.

The following table gives the number of cases of poliomyelitis (infantile paralysis) reported to the Public Health Service by State health officers from May 29 to August 13, 1921, inclusive. These reports are preliminary and necessarily incomplete.

Poliomyelitis (infantile paralysis)—Number of cases of poliomyelitis occurring in various States, as reported to the Public Health Service by the State health officers in weekly telegraphic or mail reports.

[States omitted are those from which no reports have been received or which have reported no poliomyelitis during the period covered. Leaders indicate that reports were received but no cases of poliomyelitis were reported.]

State.	Week ended (1921)—										
	June.				July.					Aug.	
	4	11	18	25	2	9	16	23	30	6	13
Arkansas.....				1							
California.....	1	1	2	5		3	3	6	10	4	9
Colorado ¹										1	
Connecticut.....				6	2	3	2	4	5	1	4
District of Columbia.....						3	4	3	7	3	
Florida.....										1	
Georgia.....		1	1		1						
Illinois.....		2	4	5	10	12	15	24	39	38	27
Indiana.....			2	1	1	1		6	8	5	2
Iowa.....					1	1	3	1	1	7	6
Kansas.....		1				2	2		1		1
Kentucky.....		1			1	2	2	1			(²)
Louisiana.....									2		
Maine.....		3					1		1		
Maryland.....		1	2	3	4	1	4	8	7	6	10
Massachusetts.....	1	2		1	4	3	6	4	10	10	12
Minnesota.....		1	1	2	10	1	3	5	101	81	48
Mississippi.....		1									
Missouri.....			(²)	6		(²)	8	3	4	5	3
Montana.....	1										2
Nebraska.....		1			3		1	2	2		4
New Jersey.....		2	1	1	2	(²)	3	1	6	7	6
New York ³				1		3	4	10	15	24	27
North Carolina.....	1		3		4	3	1			1	2
Ohio.....	(²)	(²)	(²)	(²)	(²)	(²)	(²)	(²)	27	(²)	(²)
South Dakota.....							3			2	
Texas.....								(²)	3		
Vermont.....						3	1		3	3	2
Virginia.....		(²)	(²)	1		(²)	2	1	2	(²)	(²)
West Virginia.....										2	3
Wisconsin.....	2				1	4	9	14	12	21	16

¹ Exclusive of Denver.

² No report received.

³ Exclusive of New York City.

PELLAGRA—ALEXANDRIA, LA.—A CORRECTION.

The report of 16 cases of pellagra in Alexandria, La., during the week ended June 25, 1921 (Public Health Reports, July 15, 1921, p. 1644), was an error. No cases of pellagra were reported from Alexandria during that week.

DEATHS DURING WEEK ENDED AUG. 6, 1921.

Summary of information received by telegraph from industrial insurance companies for week ended Aug. 6, 1921, and corresponding week, 1920. (From the Weekly Health Index, Aug. 9, 1921, issued by the Bureau of the Census, Department of Commerce.)

	Week ended Aug. 6, 1921.	Corresponding week, 1920.
Policies in force.....	47, 285, 282	44, 280, 116
Number of death claims.....	7, 649	6, 647
Death claims per 1,000 policies in force.....	8.4	7.8

Deaths from all causes in certain large cities of the United States during the week ended Aug. 6, 1921, infant mortality, annual death rate, and comparison with corresponding week of preceding years. (From the Weekly Health Index, Aug. 9, 1921, issued by the Bureau of the Census, Department of Commerce.)

City.	Estimated population, July 1, 1921.	Week ended Aug. 6, 1921.		Average annual death rate per 1,000. ²	Deaths under 1 year.		Infant mortality rate, week ended Aug. 6, 1921. ³
		Total deaths.	Death rate. ¹		Week ended Aug. 6, 1921.	Previous year or years. ²	
Akron, Ohio.....	229,195	25	5.7	*11.7	8	*7	77
Albany, N. Y.....	115,071	25	11.3	C 11.4	1	C 1	22
Atlanta, Ga.....	207,473	53	13.3	C 11.3	5	C 4	-----
Baltimore, Md.....	752,863	175	12.1	A 17.9	35	A 59	95
Birmingham, Ala.....	186,133	52	14.6	A 20.8	5	A 11	-----
Boston, Mass.....	757,634	158	10.9	A 15.0	28	A 34	76
Bridgeport, Conn.....	140,967	23	8.0	A 17.6	6	A 14	76
Buffalo, N. Y.....	519,608	100	10.0	C 10.4	19	C 12	73
Cambridge, Mass.....	110,444	23	10.9	A 11.2	6	A 6	107
Camden, N. J.....	119,672	27	11.8	-----	6	-----	90
Chicago, Ill.....	2,780,655	496	9.3	A 13.6	97	A 171	-----
Cincinnati, Ohio.....	403,418	95	12.3	C 11.4	21	C 9	139
Cleveland, Ohio.....	831,138	162	10.2	C 9.1	34	C 18	91
Columbus, Ohio.....	245,358	51	10.8	C 7.6	7	C 4	81
Dallas, Tex.....	165,282	44	13.9	A 12.1	2	A 2	-----
Dayton, Ohio.....	158,119	32	10.6	C 7.1	6	C 4	98
Denver, Colo.....	263,152	51	10.1	A 10.6	3	-----	-----
Detroit, Mich.....	1,070,450	170	8.3	C 10.0	42	C 44	79
Fall River, Mass.....	120,668	32	13.8	C 10.4	12	C 5	180
Grand Rapids, Mich.....	141,197	31	11.4	C 8.6	4	C 5	68
Houston, Tex.....	144,340	34	12.3	-----	1	-----	-----
Indianapolis, Ind.....	325,215	71	11.4	C 13.1	8	C 13	62
Jersey City, N. J.....	302,788	55	9.5	C 11.1	20	C 13	138
Kansas City, Kans.....	103,884	20	10.0	C 15.3	3	C 8	72
Kansas City, Mo.....	336,157	73	11.3	C 10.2	11	C 8	-----
Los Angeles, Calif.....	611,921	151	12.9	A 12.5	14	A 11	66
Louisville, Ky.....	236,083	51	11.3	C 8.2	6	C 3	69
Lowell, Mass.....	113,757	26	11.9	A 18.1	8	A 13	129
Memphis, Tenn.....	165,389	32	10.1	C 14.0	8	C 5	-----
Milwaukee, Wis.....	468,386	50	5.6	A 12.2	7	A 16	31
Minneapolis, Minn.....	392,815	64	8.5	C 10.2	8	C 7	46
Nashville, Tenn.....	122,036	40	17.1	C 19.3	7	C 17	-----
New Bedford, Mass.....	125,012	20	8.3	A 19.9	7	C 9	108
New Haven, Conn.....	167,007	28	8.7	C 8.6	7	C 9	83
New Orleans, La.....	394,657	136	18.0	A 18.1	16	A 18	-----
New York, N. Y.....	5,751,867	1,107	10.0	C 10.3	228	C 231	-----
Newark, N. J.....	424,885	88	10.8	C 10.6	31	C 21	138
Norfolk, Va.....	121,260	30	12.9	A 10.4	5	A 4	25
Oakland, Calif.....	226,472	41	9.4	-----	2	-----	-----
Omaha, Neb.....	197,066	54	14.3	-----	5	-----	58
Paterson, N. J.....	137,463	34	12.9	-----	1	-----	17
Philadelphia, Pa.....	1,896,212	362	19.1	*17.0	62	*134	75
Pittsburgh, Pa.....	602,452	125	10.8	C 13.3	36	C 41	128
Portland, Oreg.....	264,859	55	10.8	A 8.6	6	A 3	60
Providence, R. I.....	239,645	51	11.1	C 11.8	12	C 11	98
Richmond, Va.....	175,686	47	13.9	C 19.6	11	C 13	134
Rochester, N. Y.....	305,229	77	13.2	C 9.6	13	C 13	101
St. Louis, Mo.....	786,164	153	10.1	C 10.3	15	C 22	-----
St. Paul, Minn.....	237,781	38	8.3	C 9.1	1	C 4	10
Salt Lake City, Utah.....	121,505	21	9.0	A 10.8	2	-----	31
San Francisco, Calif.....	520,546	155	15.5	C 10.8	6	C 12	35
Seattle, Wash.....	327,227	51	8.1	A 7.6	2	A 4	17
Springfield, Mass.....	135,877	21	8.1	C 11.1	3	C 3	45
Syracuse, N. Y.....	177,265	26	7.6	C 11.4	3	C 5	36
Toledo, Ohio.....	253,606	43	8.8	A 16.1	6	A 13	60
Trenton, N. J.....	122,760	21	8.9	A 17.7	8	A 12	122
Washington, D. C.....	454,626	90	10.3	A 17.5	16	A 22	93
Wilmington, Del.....	113,408	16	7.4	C 15.0	2	-----	-----
Worcester, Mass.....	184,972	37	10.4	C 8.6	4	C 6	43
Yonkers, N. Y.....	103,324	11	5.6	A 14.9	2	A 6	45

¹ Annual rate per 1,000 population.

² "A" indicates data for the corresponding week of the years 1913 to 1917, inclusive. "C" indicates data for the corresponding week of the year 1920.

³ Deaths under 1 year per 1,000 births—an annual rate based on deaths under 1 year for the week and estimated births for 1920. Cities left blank are not in the registration area for births.

⁴ Data based on statistics of 1915, 1916, and 1917.

PREVALENCE OF DISEASE.

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring.

UNITED STATES.

CURRENT STATE SUMMARIES.

Telegraphic Reports for Week Ended Aug. 13, 1921.

These reports are preliminary and the figures are subject to change when later returns are received by the State health officers.

ALABAMA.		COLORADO—continued.	
	Cases.		Cases.
Cerebrospinal meningitis.....	1	Mumps.....	1
Diphtheria.....	18	Scarlet fever.....	7
Hookworm disease.....	268	Smallpox.....	5
Malaria.....	15	Tuberculosis.....	25
Measles.....	2	Typhoid fever.....	11
Pellagra.....	13	Whooping cough.....	1
Pneumonia.....	2		
Scarlet fever.....	13	CONNECTICUT.	
Smallpox.....	11	Chicken pox.....	1
Tuberculosis.....	21	Diphtheria.....	19
Typhoid fever.....	53	Dysentery (bacillary).....	2
Whooping cough.....	4	German measles.....	1
		Influenza.....	1
CALIFORNIA.		Malaria.....	2
Cerebrospinal meningitis:		Measles.....	12
Los Angeles.....	1	Mumps.....	5
San Francisco.....	1	Paratyphoid fever.....	1
Influenza.....	2	Pneumonia (lobar).....	5
Lethargic encephalitis:		Poliomyelitis.....	4
Oakland.....	1	Scarlet fever.....	19
Sacramento.....	2	Trachoma.....	1
San Francisco.....	2	Tuberculosis (all forms).....	37
Pellagra.....	1	Typhoid fever:	
Poliomyelitis:		Enfield.....	10
Los Angeles.....	1	Scattering.....	9
Sacramento.....	1	Typhus fever.....	1
San Francisco.....	5	Whooping cough.....	27
San Joaquin County.....	1		
San Luis Obispo County.....	1	FLORIDA.	
Smallpox:		Diphtheria.....	13
Sutter County.....	8	Influenza.....	93
Scattering.....	12	Leprosy.....	1
Typhoid fever.....	25	Lethargic encephalitis.....	1
		Malaria.....	64
COLORADO.		Pneumonia.....	5
(Exclusive of Denver.).....		Scarlet fever.....	3
Chicken pox.....	1	Smallpox.....	8
Diphtheria.....	47	Typhoid fever.....	32
Measles.....	2	Whooping cough.....	10

GEORGIA.		INDIANA.	
	Cases.		Cases.
Chicken pox.....	2	Cerebrospinal meningitis:	
Diphtheria.....	20	Henry County.....	1
Dysentery (bacillary).....	3	Vanderburg County.....	1
Hookworm disease.....	22	Diphtheria.....	54
Influenza.....	3	Poliomyelitis:	
Malaria.....	46	Laporte County.....	1
Mumps.....	3	Marion County.....	1
Paratyphoid fever.....	2	Scarlet fever.....	54
Pellagra.....	1	Smallpox.....	7
Pneumonia.....	2	Typhoid fever.....	48
Scarlet fever.....	20	Howard County—Epidemic.	
Septic sore throat.....	4		
Smallpox.....	19		
Tuberculosis (pulmonary).....	8		
Typhoid fever.....	50		
Whooping cough.....	11		
IDAHO.		IOWA.	
Chicken pox.....	1	Cerebrospinal meningitis.....	2
Diphtheria.....	4	Diphtheria.....	6
Measles.....	1	Poliomyelitis:	
Scarlet fever.....	2	Bedford.....	1
Typhoid fever.....	2	Center Junction.....	1
		Eldridge.....	1
		Iowa City.....	1
		Moscow.....	1
		Walcott.....	1
		Scarlet fever.....	15
		Smallpox.....	1
ILLINOIS.		KANSAS.	
Cerebrospinal meningitis:		Cerebrospinal meningitis.....	2
Chicago.....	2	Chicken pox.....	1
Rockford.....	2	Diarrhea and enteritis.....	1
Diphtheria:		Diphtheria.....	37
Chicago.....	103	Dysentery (bacillary).....	2
Scattering.....	50	Malaria.....	2
Influenza.....	3	Measles.....	1
Pneumonia.....	73	Mumps.....	3
Poliomyelitis:		Pneumonia.....	4
Carlinville.....	1	Poliomyelitis.....	1
Champaign.....	1	Scarlet fever.....	51
Chandlerville.....	1	Smallpox.....	10
Chicago.....	6	Trachoma.....	2
Coles County—Lafayette Township.....	1	Tuberculosis.....	47
Greenville.....	1	Typhoid fever.....	100
Jacksonville.....	1	Whooping cough.....	27
Kewanee.....	1		
Lamotte.....	1		
McHenry County—Burton Township.....	1		
McLean County—Hudson Township.....	1		
Macoupin County—Polk Township.....	1		
Moultrie County—Lovington Township.....	1		
Nokomis.....	1		
Odell.....	1		
Quincy.....	1		
Rock Falls.....	1		
Rock Island County—Edgington Township.....	1		
Sangamon County—Chatham Township.....	1		
Shipman.....	1		
Springfield.....	1		
Waverly.....	1		
Scarlet fever:			
Chicago.....	22		
Scattering.....	30		
Smallpox.....	3		
Typhoid fever:			
Chicago.....	11		
Freeport.....	15		
Scattering.....	56		

*The dates of onset for many of these cases occurred in prior weeks.

MARYLAND.

	Cases.
Cerebrospinal meningitis.....	1
Chicken pox.....	2
Diphtheria.....	22
Dysentery.....	4
Influenza.....	3
Lethargic encephalitis.....	1
Malaria.....	19
Measles.....	22
Mumps.....	4
Ophthalmia neonatorum.....	2
Paratyphoid fever.....	1
Pneumonia (all forms).....	16
Poliomyelitis.....	10
Scarlet fever.....	8
Septic sore throat.....	1
Trachoma.....	1
Tuberculosis.....	69
Typhoid fever.....	80
Whooping cough.....	80

MASSACHUSETTS.

Cerebrospinal meningitis.....	2
Chicken pox.....	9
Conjunctivitis (suppurative).....	11
Diphtheria.....	118
Dysentery.....	1
German measles.....	4
Lethargic encephalitis.....	1
Measles.....	46
Mumps.....	12
Ophthalmia neonatorum.....	18
Pneumonia (lobar).....	18
Poliomyelitis.....	12
Scarlet fever.....	42
Septic sore throat.....	1
Tetanus.....	3
Tuberculosis (all forms).....	150
Typhoid fever.....	32
Whooping cough.....	85

MISSISSIPPI.

Diphtheria.....	24
Scarlet fever.....	3
Typhoid fever.....	19

MISSOURI.

Diphtheria.....	51
Epidemic sore throat.....	5
Glanders.....	1
Influenza.....	1
Measles.....	2
Mumps.....	2
Ophthalmia.....	1
Poliomyelitis.....	3
Scarlet fever.....	18
Smallpox.....	11
Trachoma.....	4
Tuberculosis.....	36
Typhoid fever.....	39
Whooping cough.....	32

MONTANA.

Diphtheria.....	8
Poliomyelitis—Wisdom.....	2
Scarlet fever.....	1
Smallpox.....	8
Typhoid fever.....	16

NEBRASKA.

	Cases.
Cerebrospinal meningitis:	
Omaha.....	1
Scattering.....	2
Diphtheria:	
Omaha.....	23
Scattering.....	2
Poliomyelitis:	
Omaha.....	1
Scattering.....	3
Scarlet fever.....	9
Smallpox.....	12
Tuberculosis.....	3
Typhoid fever.....	11
Whooping cough.....	14

NEW JERSEY.

Cerebrospinal meningitis.....	3
Chicken pox.....	6
Diphtheria.....	81
Influenza.....	3
Malaria.....	3
Measles.....	36
Pneumonia.....	27
Poliomyelitis.....	6
Scarlet fever.....	45
Trachoma.....	2
Typhoid fever.....	45
Whooping cough.....	122

NEW MEXICO.

Diphtheria.....	14
German measles.....	1
Measles.....	1
Mumps.....	1
Scarlet fever.....	1
Tuberculosis.....	236
Typhoid fever.....	5
Whooping cough.....	1

NEW YORK.

(Exclusive of New York City.)

Diphtheria.....	125
Influenza.....	1
Lethargic encephalitis.....	2
Measles.....	78
Pneumonia.....	49
Poliomyelitis:	
Utica.....	7
Scattering.....	20
Scarlet fever.....	75
Smallpox.....	9
Typhoid fever.....	30
Whooping cough.....	182

NORTH CAROLINA.

Cerebrospinal meningitis.....	2
Chicken pox.....	7
Diphtheria.....	96
Measles.....	14
Poliomyelitis.....	2
Scarlet fever.....	59
Septic sore throat.....	1
Smallpox.....	7
Typhoid fever.....	121
Whooping cough.....	81

Week ended Friday.

SOUTH DAKOTA.		WEST VIRGINIA.	
	Cases.		Cases.
Diphtheria.....	14	Diphtheria.....	10
Pneumonia.....	1	Measles.....	10
Scarlet fever.....	6	Poliomyelitis:	
Smallpox.....	6	Charleston.....	1
Tuberculosis.....	10	Clarksburg.....	1
Typhoid fever.....	7	Montgomery.....	1
		Scarlet fever.....	3
		Typhoid fever.....	17
TEXAS.		WISCONSIN.	
Diphtheria.....	24	Milwaukee:	
Pneumonia.....	16	Chicken pox.....	1
Smallpox.....	8	Diphtheria.....	21
Typhoid fever.....	21	Lethargic encephalitis.....	1
Whooping cough.....	8	Measles.....	2
		Pneumonia.....	1
VERMONT.		Poliomyelitis.....	4
Chicken pox.....	7	Scarlet fever.....	4
Diphtheria.....	3	Smallpox.....	1
Measles.....	14	Tuberculosis.....	25
Mumps.....	1	Typhoid fever.....	1
Poliomyelitis.....	2	Whooping cough.....	14
Scarlet fever.....	12	Scattering:	
Typhoid fever.....	2	Chicken pox.....	1
Whooping cough.....	15	Diphtheria.....	23
		Influenza.....	18
WASHINGTON.		Measles.....	10
Chicken pox.....	13	Ophthalmia neonatorum.....	1
Diphtheria.....	20	Pneumonia.....	1
Measles.....	12	Poliomyelitis.....	12
Mumps.....	1	Scarlet fever.....	27
Scarlet fever.....	10	Smallpox.....	5
Smallpox.....	23	Tuberculosis.....	18
Typhoid fever.....	10	Typhoid fever.....	16
Whooping cough.....	20	Whooping cough.....	59

Reports for Week Ended Aug. 6, 1921.

CALIFORNIA.		DISTRICT OF COLUMBIA—continued.	
	Cases.		Cases.
Cerebrospinal meningitis:		Smallpox.....	1
Bishop.....	1	Tuberculosis.....	25
Los Angeles.....	1	Typhoid fever.....	15
San Diego.....	1	Whooping cough.....	20
San Francisco.....	2		
Influenza.....	16		
Lethargic encephalitis—San Francisco.....	4		
Poliomyelitis:			
San Francisco.....	3		
Tracy.....	1		
Smallpox.....	33		
Typhoid fever.....	28		
DELAWARE.			
Diphtheria.....	1		
Malaria.....	1		
Mumps.....	1		
Scarlet fever.....	2		
Tuberculosis.....	13		
Typhoid fever.....	7		
Whooping cough.....	3		
DISTRICT OF COLUMBIA.			
Diphtheria.....	1		
Influenza.....	1		
Measles.....	2		
Pellagra.....	1		
Poliomyelitis.....	3		

SUMMARY OF CASES REPORTED MONTHLY BY STATES.

The following summary of monthly State reports is published weekly and covers only those States from which reports are received during the current week:

State.	Cerebrospinal meningitis.	Diphtheria.	Influenza.	Malaria.	Measles.	Pellagra.	Poliomyelitis.	Scarlet fever.	Smallpox.	Typhoid fever.
1921.										
Connecticut (July).....	11	146	2	3	140	.....	13	132	.....	53
District of Columbia (July).....	1	14	1	.....	116	.....	17	10	1	30
Hawaii (March).....	1	17	66	.....	132	.....	.....	1	.....	6
Hawaii (April).....	9	7	10	.....	16	.....	.....	1	.....	5
Hawaii (June).....	2	22	.....	.....	17	.....	.....	5	1	10
Massachusetts (July).....	14	441	4	8	866	.....	26	251	.....	62
Nebraska (July).....	2	44	.....	.....	20	.....	5	86	92	28
New Mexico (July).....	1	88	.....	4	5	1	.....	10	6	27
North Dakota (March).....	2	66	.....	.....	182	.....	1	107	300	3
North Dakota (April).....	.....	43	.....	.....	94	.....	.....	82	197	15
North Dakota (May).....	.....	49	.....	.....	47	.....	.....	57	215	7
North Dakota (June).....	1	29	.....	.....	32	.....	2	33	96	7
Oklahoma (April).....	.....	19	8	5	100	.....	.....	22	185	23
Oklahoma (May).....	1	38	6	.....	93	3	1	32	215	31
Vermont (July).....	1	22	.....	.....	255	.....	8	51	3	5

PLAGUE.¹

HUMAN CASES OF PLAGUE REPORTED.

Place.	Period covered.	Cases.	Deaths.	Remarks.
California:	1921.	.....	.....	.....
San Benito County.....	Feb. 7..... June 11.....	..... 1	..... 1	.....

¹ A summary of the reports received of the occurrence of plague and the finding of plague-infected rodents in the United States during 1920 was published in Public Health Reports, Jan. 7, 1921, p. 15.

PLAGUE-INFECTED RODENTS.

Place.	Period covered.	Rodents found plague infected.
California:	1921.	.....
San Benito County.....	May 22 to June 4.....	18
Florida:	.....	.....
Pensacola.....	Jan. 1 to Apr. 18..... Apr. 19 to Aug. 13.....	5 0
Louisiana:	.....	.....
New Orleans.....	Jan. 1 to May 26..... May 27 to Aug. 13.....	38 0
Texas:	.....	.....
Galveston.....	Jan. 1 to May 28..... May 29 to Aug. 13.....	1 0

¹ Ground squirrels, *Citellus beecheyi*.

TYPHUS FEVER.

Monroe County, Ohio, Aug. 2, 1921.

One death suspected of being from typhus fever occurred in Seneca Township, Monroe County, Ohio, August 2, 1921.

CITY REPORTS FOR WEEK ENDED JULY 30, 1921.

ANTHRAX.

City.	Cases.	Deaths.
New York:		
New York.....	1	1

CEREBROSPINAL MENINGITIS.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding weeks of the years 1915 to 1920, inclusive. In instances in which data for the full six years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended July 30, 1921.		City.	Median for previous years.	Week ended July 30, 1921.	
		Cases.	Deaths.			Cases.	Deaths.
California:				Missouri:			
San Francisco.....	0	.....	1	St. Louis.....	0	1	1
Georgia:				Nebraska:			
Atlanta.....	0	.....	1	Omaha.....	0	1	.....
Illinois:				New Jersey:			
Chicago.....	1	.....	1	Jersey City.....	0	1	1
Maryland:				New York:			
Baltimore.....	0	1	1	New York.....	4	2	5
Massachusetts:				Oregon:			
Boston.....	1	1	.....	Portland.....	0	1	1
Fall River.....	0	1	1	Tennessee:			
Haverhill.....	0	1	1	Memphis.....	0	.....	1
Lynn.....	0	1	.....	Virginia:			
Worcester.....	0	1	.....	Danville.....	0	.....	1
Michigan:				Washington:			
Detroit.....	1	2	1	Seattle.....	0	1	.....
Minnesota:				Wisconsin:			
Duluth.....	0	1	1	Milwaukee.....	1	1	.....

DIPHTHERIA.

See p. 2020; also Telegraphic weekly reports from States, p. 2009, and Monthly summaries by States, p. 2013.

INFLUENZA.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
California:			New York:		
San Francisco.....	1	.....	New York.....	11	1
District of Columbia:			Pennsylvania:		
Washington.....	.....	1	Philadelphia.....	1	1
Georgia:			Texas:		
Atlanta.....	1	.....	Dallas.....	1	.....
Illinois:					
Chicago.....	1	.....		
Freeport.....	.....	1			

LETHARGIC ENCEPHALITIS.

California:			Massachusetts:		
San Francisco.....	.....	1	Northampton.....	1	.....
Connecticut:			New Jersey:		
Norwalk.....	1	1	Morristown.....	1	1

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

MALARIA.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
Arkansas:			New Jersey:		
Hot Springs.....		1	New Brunswick.....	1	
Little Rock.....	8		Trenton.....	1	1
North Little Rock.....	5		New York:		
Georgia:			New York.....	5	
Atlanta.....	3		Ohio:		
Brunswick.....	14	1	Cleveland.....	1	
Illinois:			Tennessee:		
Chicago.....	1		Memphis.....	10	
Mattoon.....		1	Texas:		
Louisiana:			Austin.....		1
New Orleans.....	2		Dallas.....	11	
Massachusetts:			Galveston.....		1
Boston.....	1		Virginia:		
Newton.....	1		Richmond.....	4	

MEASLES.

See p. 2020; also Telegraphic weekly reports from States, p. 2009, and Monthly summaries by States, p. 2013.

PELLAGRA.

Alabama:			South Carolina:		
Montgomery.....	2		Charleston.....		1
Arkansas:			Tennessee:		
Fort Smith.....	1		Memphis.....	1	
Little Rock.....	2		Nashville.....		1
Louisiana:			Texas:		
New Orleans.....	1	1	Dallas.....		1
North Carolina:					
Raleigh.....		1			

PNEUMONIA (ALL FORMS).

Alabama:			Indiana:		
Birmingham.....		3	Indianapolis.....		4
California:			Kokomo.....		1
Long Beach.....	2	1	Kansas:		
Los Angeles.....	7	4	Kansas City.....	1	
Oakland.....	1	1	Topeka.....	1	
Pasadena.....	4	2	Wichita.....		2
Sacramento.....		2	Kentucky:		
San Diego.....	4	4	Covington.....		1
San Francisco.....	7	5	Lexington.....		1
Colorado:			Louisville.....		2
Colorado Springs.....		1	Louisiana:		
Denver.....		3	New Orleans.....		4
Greeley.....		1	Maine:		
Connecticut:			Lewiston.....		2
Hartford.....		1	Maryland:		
Meriden.....	1		Baltimore.....	12	9
Milford.....	1	1	Cumberland.....	1	
New Haven.....		1	Massachusetts:		
New London.....		1	Boston.....		5
Waterbury.....	2		Brockton.....	1	
District of Columbia:			Cambridge.....		1
Washington.....		5	Everett.....	1	1
Georgia:			Framingham.....		1
Atlanta.....		2	Holyoke.....		1
Savannah.....		1	Methuen.....		1
Illinois:			Newton.....	1	1
Chicago.....	56	17	Quincy.....	1	
Decatur.....		1	Saugus.....	1	
Jacksonville.....		1	Springfield.....		1
Peoria.....		3	Taunton.....		1
Rockford.....		1	Wakefield.....	1	1
Springfield.....	2		Worcester.....	1	4

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

PNEUMONIA (ALL FORMS)—Continued.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
Michigan:			Ohio:		
Detroit.....	13	6	Akron.....	1	.....
Grand Rapids.....	1	1	Bucyrus.....	1	1
Hamtramck.....	.....	1	Cincinnati.....	.....	6
Highland Park.....	1	.....	Cleveland.....	14	.....
Kalamazoo.....	1	.....	Dayton.....	2	.....
Minnesota:			Hamilton.....	.....	1
Minneapolis.....	1	.....	Lima.....	.....	1
St Paul.....	.....	1	Lorain.....	1	1
Missouri:			Niles.....	1	1
Kansas City.....	1	2	Springfield.....	.....	1
St Joseph.....	.....	2	Toledo.....	.....	2
Springfield.....	.....	1	Youngstown.....	.....	1
Nebraska:			Oregon:		
Omaha.....	.....	2	Portland.....	.....	2
New Jersey:			Pennsylvania:		
Bloomfield.....	1	.....	Philadelphia.....	14	10
Elizabeth.....	.....	1	Rhode Island:		
Garfield.....	1	.....	Pawtucket.....	.....	2
Hackensack.....	1	.....	Providence.....	.....	2
Hoboken.....	.....	1	South Carolina:		
Jersey City.....	.....	8	Spartanburg.....	.....	1
Montclair.....	1	.....	Tennessee:		
Newark.....	18	3	Memphis.....	.....	1
Orange.....	1	.....	Nashville.....	.....	1
Paterson.....	1	.....	Texas:		
Trenton.....	5	.....	Austin.....	.....	1
New Mexico:			Waco.....	.....	1
Albuquerque.....	1	.....	Utah:		
New York:			Salt Lake City.....	.....	1
Buffalo.....	2	.....	Virginia:		
Cohoes.....	1	.....	Alexandria.....	1	.....
Elmira.....	4	1	Norfolk.....	.....	1
Glens Falls.....	1	.....	Richmond.....	.....	2
Lackawanna.....	1	.....	West Virginia:		
Mount Vernon.....	3	2	Charleston.....	.....	1
New York.....	191	53	Huntington.....	.....	1
North Tonawanda.....	.....	1	Wisconsin:		
Rochester.....	.....	2	Oshkosh.....	.....	1
Rome.....	1	1	Racine.....	.....	1
Syracuse.....	3	.....	Wyoming:		
Yonkers.....	1	1	Cheyenne.....	2	2
North Carolina:					
Greensboro.....	.....	1			

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

POLIOMYELITIS (INFANTILE PARALYSIS).

The column headed "Median for previous years" gives the median number of cases reported during the corresponding weeks of the years 1915 to 1920, inclusive. In instances in which data for the full six years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended July 30, 1921.		City.	Median for previous years.	Week ended July 30, 1921.	
		Cases.	Deaths.			Cases.	Deaths.
California:				Minnesota:			
Oakland.....	0	1	.....	Duluth.....	0	1	.....
Sacramento.....	0	1	.....	Minneapolis.....	0	4	3
San Francisco.....	0	6	2	St. Paul.....	0	1	.....
Connecticut:				Missouri:			
Greenwich.....	.....	1	.....	St. Louis.....	0	2	2
Norwalk.....	.....	1	.....	New Jersey:			
District of Columbia:				Elizabeth.....	0	1	1
Washington.....	0	7	.....	Montclair.....	0	1	.....
Illinois:				Paterson.....	0	5	.....
Chicago.....	5	5	1	New York:			
Jacksonville.....	0	3	.....	New York.....	5	13	1
Springfield.....	0	3	1	Port Chester.....	.....	1	.....
Indiana:				Yonkers.....	0	1	.....
South Bend.....	0	1	.....	Ohio:			
Iowa:				Akron.....	0	1	.....
Cedar Rapids.....	0	1	.....	Chillicothe.....	0	1	1
Muscatine.....	0	1	.....	Cleveland.....	1	5	.....
Kansas:				Columbus.....	0	1	1
Wichita.....	0	1	.....	Youngstown.....	0	1	1
Maryland:				Pennsylvania:			
Baltimore.....	1	1	1	Harrisburg.....	0	1	.....
Massachusetts:				Philadelphia.....	1	2	.....
Adams.....	.....	1	.....	Texas:			
Boston.....	0	2	.....	El Paso.....	0	1	.....
Haverhill.....	0	2	1	Virginia:			
Lawrence.....	0	1	.....	Norfolk.....	0	1	.....
Norwood.....	0	2	.....	Richmond.....	0	1	.....
Springfield.....	0	1	.....	West Virginia:			
Michigan:				Charleston.....	0	1	1
Alpena.....	0	2	.....	Wisconsin:			
Detroit.....	0	7	2	Milwaukee.....	0	2	.....
Flint.....	0	1	.....	Wausau.....	0	4	.....
Pontiac.....	0	1	.....			

RABIES IN ANIMALS.

City.	Cases
California:	
Los Angeles.....	3
Missouri:	
Kansas City.....	3
North Carolina:	
Winston-Salem.....	1
Ohio:	
Ironton.....	2

RABIES IN MAN.

City.	Cases.	Deaths.
Massachusetts:		
Boston.....	1	1
New York:		
New York.....	1	1

SCARLET FEVER.

See p. 2020; also Telegraphic weekly reports from States, p. 2009, and Monthly summaries by States, p. 2013.

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

SMALLPOX.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding weeks of the years 1915 to 1920, inclusive. In instances in which data for the full six years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended July 30, 1921.		City.	Median for previous years.	Week ended July 30, 1921.	
		Cases.	Deaths.			Cases.	Deaths.
Alabama:				Michigan:			
Birmingham.....	1	7		Ishpeming.....	0	1	
Mobile.....	0	2	1	Minnesota:			
California:				Duluth.....	1	1	
Bakersfield.....	0	2		St. Paul.....	3	2	
Long Beach.....	0	1		Montana:			
Los Angeles.....	0	11		Billings.....	0	2	
San Diego.....	0	7		Great Falls.....	0	6	
San Francisco.....	0	7		Nebraska:			
Colorado:				Omaha.....	3	1	
Denver.....	3	10		Ohio:			
Pueblo.....	0	1		Columbus.....	0	1	
District of Columbia:				Newark.....	0	2	
Washington.....	0	1		Oregon:			
Georgia:				Portland.....	4	4	
Atlanta.....	4	2		Tennessee:			
Macon.....	0	1		Chattanooga.....	0	1	
Indiana:				Utah:			
Bloomington.....	0	1		Salt Lake City.....	1	5	
Elkhart.....	1	2		Washington:			
Evansville.....	1	2		Everett.....	0	1	
Indianapolis.....	1	1		Seattle.....	5	7	
Iowa:				Spokane.....	5	5	
Des Moines.....	0	1		Tacoma.....	1	4	
Muscataine.....	0	1		West Virginia:			
Kansas:				Bluefield.....	1	1	
Topeka.....	0	2		Fairmont.....	0	2	

TETANUS.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
California:			New Jersey:		
Santa Barbara.....		1	Bloomfield.....	1	
Connecticut:			Jersey City.....		1
Bridgeport.....	1		New York:		
Waterbury.....	1	1	New York.....	2	
Georgia:			Ohio:		
Savannah.....		1	Columbus.....		1
Illinois:			Pennsylvania:		
Chicago.....	1	1	Philadelphia.....		2
Indiana:			Rhode Island:		
Hammond.....		1	Providence.....		1
Indianapolis.....		1	South Carolina:		
Louisiana:			Charleston.....		2
New Orleans.....		1	West Virginia:		
Maryland:			Charleston.....		1
Cumberland.....		1			
Missouri:					
St. Louis.....	1				

TUBERCULOSIS.

See p. 2020; also Telegraphic weekly reports from States, p. 2009.

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

TYPHOID FEVER.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding weeks of the years 1915 to 1920, inclusive. In instances in which data for the full six years are incomplete, the median is that for the number of years for which information is available.

City.	Median for pre- vious years.	Week ended July 30, 1921.		City.	Median for pre- vious years.	Week ended July 30, 1921.	
		Cases.	Deaths.			Cases.	Deaths.
Alabama:				Maryland:			
Anniston.....	1	1	.....	Baltimore.....	17	13	3
Birmingham.....	25	6	3	Massachusetts:			
Mobile.....	0	1	.....	Adams.....	0	2	.....
Montgomery.....	3	2	.....	Boston.....	6	1	1
Arizona:				Brockton.....	0	2	.....
Tucson.....	0	.....	1	Chicopee.....	0	1	.....
Arkansas:				Fall River.....	1	2	.....
Little Rock.....	1	5	.....	Lawrence.....	1	.....	1
North Little Rock.....	1	2	.....	Lynn.....	1	.....	.....
California:				New Bedford.....	0	1	.....
Long Beach.....	0	2	.....	Springfield.....	1	2	.....
Los Angeles.....	4	1	1	West Springfield.....	1	1	.....
Oakland.....	1	5	.....	Worcester.....	1	3	.....
Sacramento.....	0	1	.....	Michigan:			
San Bernardino.....	0	1	.....	Detroit.....	15	10	1
San Francisco.....	2	2	1	Flint.....	1	3	1
Colorado:				Muskegon.....	0	7	.....
Denver.....	1	1	1	Minnesota:			
Pueblo.....	0	.....	1	Minneapolis.....	1	4	.....
Trinidad.....	0	2	.....	St. Paul.....	1	13	3
Connecticut:				Missouri:			
Bridgeport.....	0	1	.....	Kansas City.....	2	2	1
Hartford.....	0	2	.....	St. Louis.....	7	3	1
New Haven.....	2	3	.....	Montana:			
District of Columbia:				Great Falls.....	1	1	.....
Washington.....	7	9	2	Nebraska:			
Georgia:				Lincoln.....	0	5	.....
Atlanta.....	2	2	.....	New Hampshire:			
Brunswick.....	0	1	.....	Manchester.....	0	1	.....
Savannah.....	1	4	.....	New Jersey:			
Valdosta.....	.....	1	.....	Elizabeth.....	0	1	.....
Illinois:				Newark.....	0	3	1
Aurora.....	0	1	.....	Perth Amboy.....	0	2	.....
Blue Island.....	.....	1	.....	Trenton.....	0	1	1
Centralia.....	0	1	.....	New York:			
Chicago.....	9	4	.....	Albany.....	1	1	.....
Cicero.....	.....	2	.....	Buffalo.....	1	1	.....
Decatur.....	0	2	.....	Ithaca.....	0	3	.....
Freeport.....	0	2	.....	Lockport.....	0	2	.....
Galesburg.....	0	1	.....	New York.....	31	33	5
Oak Park.....	0	1	.....	Niagara Falls.....	0	2	.....
Rockford.....	0	1	.....	North Tonawanda.....	1	1	.....
Indiana:				Rochester.....	2	1	.....
Evansville.....	1	.....	1	Schenectady.....	0	1	1
Fort Wayne.....	1	.....	1	Syracuse.....	0	1	.....
Hammond.....	1	1	.....	North Carolina:			
Indianapolis.....	2	3	.....	Charlotte.....	9	1	.....
Kokomo.....	0	2	.....	Durham.....	1	2	.....
La Fayette.....	0	1	.....	Winston-Salem.....	4	1	.....
Muncie.....	0	1	.....	Ohio:			
Terre Haute.....	1	1	.....	Akron.....	0	3	.....
Iowa:				Barberton.....	0	1	.....
Waterloo.....	.....	2	.....	Canton.....	1	.....	1
Kansas:				Chillicothe.....	0	2	.....
Coffeyville.....	2	2	.....	Cleveland.....	5	6	.....
Kansas City.....	1	4	.....	Columbus.....	2	1	.....
Lawrence.....	0	1	.....	Dayton.....	1	8	.....
Parsons.....	0	1	.....	East Cleveland.....	0	1	.....
Salina.....	.....	3	.....	Ironton.....	1	1	.....
Wichita.....	3	6	1	Kenmore.....	.....	1	.....
Kentucky:				Lorain.....	0	1	.....
Covington.....	1	1	.....	Niles.....	.....	2	.....
Lexington.....	0	3	1	Toledo.....	2	1	1
Louisville.....	10	6	1	Youngstown.....	1	2	1
Paducah.....	1	1	.....	Oklahoma:			
Louisiana:				Oklahoma City.....	2	2	.....
New Orleans.....	4	2	.....	Pennsylvania:			
Maine:				Altoona.....	3	1	.....
Bangor.....	0	2	.....	Bethlehem.....	0	3	.....

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

TYPHOID FEVER—Continued.

City.	Median for pre- vious years.	Week ended July 30, 1921.		City.	Median for pre- vious years.	Week ended July 30, 1921.	
		Cases.	Deaths.			Cases.	Deaths.
Pennsylvania—Contd.				Utah:			
Canonsburg.....		1		Salt Lake City.....	1	3	
Carnegie.....	0	1		Virginia:			
Chambersburg.....	0	5		Alexandria.....	0	1	
Harrisburg.....	0	2		Danville.....	0	1	
Jeanette.....		2		Lynchburg.....	1	5	
Johnstown.....	1	3		Norfolk.....	4	4	
North Braddock.....	0	1		Petersburg.....	2	5	
Philadelphia.....	12	17	2	Richmond.....	4	4	
Pittsburgh.....	2	9		Roanoke.....	1	5	
Reading.....	1	2		Washington:			
Shamokin.....	0	1		Everett.....	0	1	
Sharon.....	0	1		Seattle.....	1	3	
Woodlawn.....		1		West Virginia:			
York.....	1	1		Bluefield.....	0	1	
South Carolina:				Charleston.....	1	3	
Charleston.....	5		1	Fairmont.....	5	4	
Columbia.....	1	1		Huntington.....	0	5	1
Tennessee:				Martinsburg.....	1	2	
Knoxville.....	7	3	1	Morgantown.....	0	3	
Memphis.....	5	1		Parkersburg.....	0	1	1
Nashville.....	13	12		Wheeling.....	1	1	1
Texas:				Wisconsin:			
Beaumont.....	0		1	Beloit.....	0	1	
Corpus Christi.....	2	1		La Crosse.....	0	1	
Dallas.....	2	1		Marquette.....	0	2	
El Paso.....	0	2		Milwaukee.....	1	1	
Fort Worth.....	9	4		Wausau.....	0	1	

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS.

City.	Popula- tion Jan. 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuber- culosis.		
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
Alabama:											
Anniston.....	17,734									1	
Birmingham.....	178,270	60	1	1						7	1
Mobile.....	60,151	17									1
Montgomery.....	43,464		1							1	
Tuscaloosa.....	11,996		1							1	
Arizona:											
Tucson.....	20,292	13									3
Arkansas:											
Fort Smith.....	23,811		2								
Hot Springs.....	11,695	6									1
Little Rock.....	64,997		1								
North Little Rock.....	14,048		3								
California:											
Alameda.....	23,806	5	1								
Bakersfield.....	18,633	10					1			1	
Eureka.....	12,423	3								1	
Long Beach.....	55,593	15	2							2	
Los Angeles.....	576,673	125	47	1	3		5		97	16	
Oakland.....	216,361	47	11				2		2	3	
Pasadena.....	45,354	12			1		1		2	2	
Richmond.....	16,843	1					1				
Riverside.....	19,341	3								1	
Sacramento.....	65,857	18	6				4		4	2	
San Bernardino.....	18,721	4									1
San Diego.....	74,633	24			9			1	9	3	
San Francisco.....	593,410	122	17				4		18	7	
Santa Barbara.....	19,441	3									
Santa Cruz.....	10,917	2									
Vallejo.....	21,107	3									

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Colorado:										
Colorado Springs.....	30,105	14	1	1					7	3
Denver.....	256,369	54	5				1			9
Greeley.....	10,883	2								
Pueblo.....	42,908	17	5	2						1
Connecticut:										
Bridgeport.....	143,538	24	7	2	1		6	1	9	1
Bristol.....	20,620	2								
Derby.....	11,238	3								
Fairfield (town).....	11,475								1	
Greenwich (town).....	22,123									1
Hartford.....	138,036	42	4		11		3		3	
Manchester (town).....	18,370	3					1			
Meriden (town).....	34,739								2	
Milford (town).....	10,193	2	2						2	
New Britain.....	59,316	15	2							
New Haven.....	162,519	43	3	1			1		1	5
New London.....	25,688	8	1				1			
Norwalk.....	27,700	5							1	
Norwich (town).....	29,685	4							1	
Stamford (town).....	40,057								2	
Stonington (town).....	10,236	3								1
Waterbury.....	91,410	27	1		2		2		7	2
District of Columbia:										
Washington.....	437,571	118	4		8		1		22	6
Georgia:										
Atlanta.....	200,616	63	6	1			1			4
Brunswick.....	14,413	3								2
Macon.....	52,995	23	3							1
Savannah.....	83,252	26	2	2			1			
Valdosta.....	10,783	2								
Idaho:										
Boise.....	21,303	4					2			
Illinois:										
Alton.....	24,682	2								
Aurora.....	36,597	11	1		1					1
Bloomington.....	28,725	5							1	
Blue Island.....	11,424	4	1		1					
Centralia.....	12,491	2	1		1					
Chicago.....	2,701,705	544	80	2	21		30	3	204	48
Cicero.....	44,995	6	1				1			1
Danville.....	33,750	8								
Decatur.....	43,818	9								1
East St. Louis.....	66,740	11							1	1
Elgin.....	27,454	6	1						1	1
Evanston.....	37,215	10	2				2			
Forest Park.....	10,768	1	1							
Freeport.....	19,669	7	2						1	
Galesburg.....	23,534	3	1				1			
Jacksonville.....	15,713	11					1			1
Kewanee.....	16,026	4			1		1			
La Salle.....	13,050									1
Oak Park.....	32,830	7	2						1	
Peoria.....	76,121	19	2				3		1	
Rockford.....	65,651	12	2				2			
Rock Island.....	35,177	10	1						2	1
Springfield.....	59,183	17	1				1			2
Indiana:										
Bloomington.....	11,595	5							1	
Crawfordsville.....	10,139	5								
Elkhart.....	24,277	4								
Evansville.....	85,261	16	1							
Fort Wayne.....	36,549	15	3							
Frankfort.....	11,585	1					1			
Gary.....	55,378	15	2							1
Hammond.....	36,004	12	4							
Indianapolis.....	314,194	68	7	2	1		3		11	4
Kokomo.....	30,067	10								1
La Fayette.....	22,486	6	2				1		1	
Logansport.....	21,626	6	1							
Marion.....	23,747	5								1
Mishawaka.....	15,195	6								
Muncie.....	36,624	14	1				2			3
South Bend.....	70,983	10								2
Terre Haute.....	66,083	20	1				1			1

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Popula- tion Jan. 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuber- culosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Iowa:										
Burlington.....	24,057	8								
Cedar Rapids.....	45,566						1			
Davenport.....	56,727						1			
Des Moines.....	126,468		3				1			
Dubuque.....	39,141		1							
Iowa City.....	11,267		1							
Mason City.....	20,085	6					1			
Muscatine.....	16,068	10								
Kansas:										
Atchison.....	12,630		3				1		1	
Coffeyville.....	13,452	4	3				3		2	
Fort Scott.....	10,693	2							2	
Kansas City.....	101,177						2		7	
Lawrence.....	12,456	2								
Leavenworth.....	16,912		2							
Parsons.....	16,028	5								
Salina.....	15,085	6	1							
Topeka.....	50,022	5	3				1		4	
Wichita.....	72,128	24	9		1		3		3	1
Kentucky:										
Covington.....	57,121	19	3						1	1
Lexington.....	41,534	20							1	
Louisville.....	234,891	75			7				4	6
Louisiana:										
Monroe.....	12,675	7								2
New Orleans.....	387,219	105	3						11	7
Maine:										
Auburn.....	16,985	3	1							
Bangor.....	25,978						2		1	
Biddeford.....	18,008	7								1
Lewiston.....	31,791	14			1		3			
Portland.....	69,272	14	3		1		1			
Sanford.....	10,691	1								
Waterville.....	13,351		1							
Maryland:										
Baltimore.....	738,826	195	13	1	8		6		45	16
Cumberland.....	29,837	13	3	1			1			
Massachusetts:										
Adams.....	12,967	3								
Amesbury.....	10,036	1	2							
Attleboro.....	19,731	3								
Belmont.....	10,749	2								
Beverly.....	22,561	6								
Boston.....	748,060	203	27	3	37	2	8		33	14
Braintree.....	10,580	4								
Brookton.....	66,138	8	1		1		2		1	2
Brookline.....	37,748	6	1		1		1		2	1
Cambridge.....	109,694	28	4		1				4	2
Chelsea.....	43,184	4	1						2	
Chicopee.....	36,214	9	1						2	
Clinton.....	12,979	2					2		1	
Danvers.....	11,108								1	
Dedham.....	19,792	4								
Easthampton.....	11,261		1							
Everett.....	40,120	9	1						5	3
Fall River.....	120,485	33	3						3	2
Frammingham.....	17,033	6			1					
Gardner.....	16,971	3			1					1
Greenfield.....	15,462	6								
Haverhill.....	53,884	16	1						5	
Holyoke.....	60,203	17	1		1				4	
Lawrence.....	94,270	23	4		1				5	3
Leominster.....	19,744	2							2	
Lowell.....	112,479	34	5						7	1
Lynn.....	99,148	13	1	1	13				3	
Malden.....	49,103	13			10				7	2
Medford.....	39,038	8	3		3				1	2
Melrose.....	18,204	3								
Methuen.....	15,139	3			2		1		2	
New Bedford.....	121,217	26	1				1		5	2
Newburyport.....	15,618	3							1	
Newton.....	46,054	11			1				1	
North Adams.....	22,282	4								1

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Popula- tion Jan. 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuber- culosis.		
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
Massachusetts—Continued.											
Northampton.....	21,951	8	1						1		
Norwood.....	12,627	0									
Peabody.....	19,552	4	1								
Pittsfield.....	41,751	5					1				
Plymouth.....	13,045	2									
Quincy.....	47,876	10	4		8				1		
Saugus.....	10,874	1			1						
Somerville.....	93,091	13	1	1	4				2	2	
Southbridge.....	14,245	2			1		1				
Springfield.....	129,563	26	2		1		3		3	1	
Taunton.....	37,137	10			2				2		
Wakefield.....	13,025	2	2		1						
West Springfield.....	13,443	2			2		1				
Westfield.....	18,604	6									
Winthrop.....	15,455	6			1						
Woburn.....	16,574	1									
Worcester.....	179,754	32	2		3		2		4	4	
Michigan:											
Alpena.....	11,101						1				
Ann Arbor.....	19,516	12	1				1			1	
Detroit.....	993,739	194	41	2	4		21	2	40	17	
Flint.....	91,599	20	7	2			6			2	
Grand Rapids.....	137,634	32	3				2		5	3	
Hamtramck.....	48,615	12									
Highland Park.....	46,499	8	2				1				
Ishpeming.....	10,500	4									
Kalamazoo.....	48,858	17					3		1	1	
Marquette.....	12,718	2	1								
Muskegon.....	36,570	6			1						
Pontiac.....	34,273	9	4	1			3				
Port Huron.....	25,944	6			1		1				
Sault Ste. Marie.....	12,096	0							3		
Minnesota:											
Austin.....	10,118	3									
Duluth.....	98,917	8	4						1		
Mankato.....	12,469	3									
Minneapolis.....	380,582	76	9		2		13		33	5	
Rochester.....	13,722	23					1				
St. Cloud.....	15,873		4								
St. Paul.....	234,595	43	5	1	1		5		16	1	
Winona.....	19,143	2			1		2				
Missouri:											
Cape Girardeau.....	10,252	7									
Independence.....	11,686	4	1						1	1	
Joplin.....	29,855										
Kansas City.....	324,410	98	4				1		4	10	
St. Joseph.....	77,939	36			3						
St. Louis.....	772,897	172	20				5	1	44	13	
Springfield.....	39,631	15								1	
Montana:											
Billings.....	15,100	4							1		
Great Falls.....	24,121	7	1							1	
Missoula.....	12,668	7									
Nebraska:											
Lincoln.....	54,934	6					1				
Omaha.....	191,601	34	15		2			1			
Nevada:											
Reno.....	12,016	5									
New Hampshire:											
Berlin.....	16,104	3									
Concord.....	22,167	9									
Dover.....	13,029	1									
Keene.....	11,210	2					1		2	1	
Manchester.....	78,384	15	1							1	
New Jersey:											
Asbury Park.....	12,400	4									
Bayonne.....	76,754		1						1		
Belleville.....	15,660				1						
Bloomfield.....	22,019		2		6						
Clifton.....	26,470	2	3				2			1	
Elizabeth.....	95,682		5	1	2		4		1		
Englewood.....	11,627	3	1				1				
Garfield.....	19,381	1									

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
New Jersey—Continued.										
Hackensack.....	17,667	4	1	1					2	
Hoboken.....	68,166	11	3	1					5	
Irvington.....	23,480								1	
Jersey City.....	297,864	75	7	1	3		3		5	6
Montclair.....	25,810	5			1		1		2	
Morristown.....	12,548	6			2				1	1
New Brunswick.....	32,779									1
Newark.....	414,216	98	8	2	13		7		34	8
Orange.....	33,268	7	1		2					
Passaic.....	63,824	16	1		1				1	
Paterson.....	135,866		4		6				3	
Perth Amboy.....	41,707	7	4						1	
Phillipsburg.....	16,923	3								
Plainfield.....	27,700	5	1				2			2
Rahway.....	11,042	4					1			
Summit.....	10,174	3	3							
Trenton.....	119,282	40			8					4
West Hoboken.....	40,068	7					1	1	1	
West New York.....	29,926	1			3					
West Orange.....	15,578	0	1		1					
New Mexico:										
Albuquerque.....	15,187	8			1					1
New York:										
Albany.....	113,344		5		1				7	
Auburn.....	36,192	17	2							2
Buffalo.....	506,775	107	4	2	1		5		48	11
Cohoes.....	22,987	5								
Elmira.....	45,305	9	1		2		2			
Geneva.....	14,648	3		1						
Glens Falls.....	16,638	7								
Ithaca.....	17,004	2								
Jamestown.....	38,917	5								
Lackawanna.....	17,918	3	1							
Lockport.....	21,308	5								
Mount Vernon.....	42,726	9					1		2	2
Newburgh.....	30,366	6							1	2
New York.....	5,621,151	1,225	129	5	77	4	30	1	1215	193
Niagara Falls.....	50,760	12					4		1	
North Tonawanda.....	15,482	5								
Ogdensburg.....	14,009	7								
Olean.....	20,506	6								
Pekskill.....	15,868	9			1				1	
Port Chester.....	16,573	4								
Poughkeepsie.....	35,000	5					1		1	
Rochester.....	295,750	72	6	1	2		4		10	
Rome.....	26,341	7	2							1
Saratoga Springs.....	13,181	4							1	
Schenectady.....	88,723	17	3		2				6	1
Syracuse.....	171,717	30	5		4		4		1	
Troy.....	72,013	17					2		2	2
Watervliet.....	16,073	4								
White Plains.....	21,081	4								
Yonkers.....	100,226	16	4							2
North Carolina:										
Charlotte.....	46,338	10							3	1
Durham.....	21,719	4								1
Greensboro.....	19,861	7								
Raleigh.....	24,418	13	2							1
Rocky Mount.....	12,742	5								1
Salisbury.....	13,584	0								
Winston-Salem.....	48,395	10	1						2	
North Dakota:										
Fargo.....	21,961		1				1			
Ohio:										
Akron.....	208,435	19	2		2		1		15	
Alliance.....	21,603	6	1							1
Ashtabula.....	22,082	4	1							
Barberton.....	18,811	5	1						1	
Bucyrus.....	10,425	3								
Canton.....	87,091	16	2		1		1		1	
Chillicothe.....	15,531	4								

¹ Pulmonary tuberculosis only.

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Popula- tion Jan. 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuber- culosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Ohio—Continued.										
Cincinnati	401,247	98	8		1				18	7
Cleveland	796,836		22		5		10			
Columbus	237,031	64	6		1		3		2	
Cuyahoga Falls	10,200	1					1			
Dayton	152,559	33	1				11			
East Cleveland	27,292	2								
Elyria	20,474	5								1
Freemont	12,468	1								
Hamilton	39,675	8	1	1						
Ironton	14,067	3					1			1
Kentmore	12,683									
Lima	41,306	8			1		1			
Lorain	37,295									
Mansfield	27,824	7	1		2		1		1	
Marion	27,891	1	1							
Middletown	23,594	8					1	1		
Newark	26,718	13								1
Niles	13,080	5	1				1			
Norwood	24,996	3								
Salem	10,305	3								1
Sandusky	22,897	7							1	
Springfield	60,840	13	6		1		1		2	1
Steubenville	28,508	8							2	
Tiffin	14,375	6								
Toledo	243,109	51	13				1			7
Youngstown	132,358		1				1			3
Zanesville	29,569	9	1							
Oklahoma:										
Oklahoma City	91,258	18	2				2		2	2
Oregon:										
Portland	258,288	37	14	2	2				2	3
Pennsylvania:										
Allentown	73,502								1	
Altoona	60,331						3			
Beaver Falls	12,802						2			
Bethlehem	50,358		1							
Charleroi	11,516						1			
Chester	58,030		1				3			
Dickson City	11,049		1						1	
Duquesne	19,011		1				6			
Erie	93,372		2						2	
Harrisburg	75,917				1					
Homestead	20,452		2				1		6	
Johnstown	67,327		1		2				1	
McKeesport	45,975		2							
McKees Rocks	16,713						1		2	
Meadville	14,568						1			
Norristown	32,319						2			
North Braddock	14,928		1							
Oil City	21,274		2				1			
Philadelphia	1,823,158	349	39	2	7		31	1	62	42
Pittsburgh	588,193		16		11		12		31	
Pottstown	17,431		1							
Reading	107,784		5		3					
Seranton	137,783		1				1			
Shenandoah	24,726						1			
Woodlawn	12,495		1						1	
York	47,512		1						2	
Rhode Island:										
Cranston	29,407	5								
East Providence (town)	21,793		2							
Newport	30,255	10								
Pawtucket	64,248	23	5							
Providence	237,595	47	5		6		3			
South Carolina:										
Charleston	67,957	25					2			1
Columbia	37,524						1		1	
Spartanburg	22,638	7								
South Dakota:										
Sioux Falls	25,176	6	2							

CITY REPORTS FOR WEEK ENDED JULY 30, 1921—Continued.
DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population Jan. 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Tennessee:										
Chattanooga.....	57,805		3				2		1	
Knoxville.....	77,818								3	3
Memphis.....	162,351	59	4				1		10	5
Nashville.....	118,342	48			2				2	4
Texas:										
Austin.....	34,876	19	1							
Beaumont.....	40,422	4							1	
Corpus Christi.....	10,522	4	1							
Dallas.....	158,976	39	4		4				7	1
El Paso.....	77,543	51								10
Fort Worth.....	106,482		3							
Galveston.....	44,255	16								1
Waco.....	38,500	8	2							1
Utah:										
Salt Lake City.....	118,110	30	1	1						3
Vermont:										
Burlington.....	22,779	7	3							
Rutland.....	14,954	7								
Virginia:										
Alexandria.....	18,090	3								
Danville.....	21,539	6	4	1	2		1		1	
Lynchburg.....	29,955	7	1		1		1			
Norfolk.....	115,777						1		1	2
Petersburg.....	31,002	13		1	3				4	1
Richmond.....	171,667	47	1		4				40	3
Roanoke.....	50,842	17	11				1		1	2
Washington:										
Aberdeen.....	15,337	5							1	
Everett.....	27,644				2					
Seattle.....	315,652		3		6		4			
Spokane.....	104,437		1		4				1	
Tacoma.....	96,965		1		2				1	
Vancouver.....	12,637		1							
West Virginia:										
Bluefield.....	15,282		2							
Charleston.....	39,606	15	1						1	1
Fairmont.....	17,851		1							
Huntington.....	50,177	21	1							2
Martinsburg.....	12,515				3					
Moundsville.....	10,669						1			
Parkersburg.....	20,050	17	1							1
Wheeling.....	54,322	17	4		1		5			
Wisconsin:										
Appleton.....	19,561						3			
Beloit.....	21,284	6							1	
Eau Claire.....	20,880						1			
Fond du Lac.....	23,427	1	3							
Green Bay.....	31,017	4	2							
Janesville.....	18,293	3			1					
Kenosha.....	40,472	8								
La Crosse.....	30,363		1		1					
Madison.....	38,378	4	1	1						
Manitowoc.....	17,563								1	
Marinette.....	13,610								1	
Milwaukee.....	457,147		6		4		7		10	
Oshkosh.....	33,162	7	4						2	
Racine.....	58,593	9	4		2		2			1
Sheboygan.....	30,955						1		1	
Superior.....	39,624	7								
Wausau.....	18,661		1						1	
Wyoming:										
Cheyenne.....	13,829	3								

FOREIGN AND INSULAR.

ALGERIA.

Plague—District of Aumale.

Under date of August 4, 1921, five centers of plague infection were reported in the native district of Aumale, about 140 kilometers distant from Algiers, with a total of 71 cases with 22 deaths reported during the period from May 31 to July 3, 1921.

CHINA.

Chefoo—Improved Quarantine Facilities Recommended.

In view of the arrival at Chefoo, China, May 3, 1921,¹ of the Russian Volunteer Fleet steamship *Kishenev* from Vladivostok, Siberia, with two cases of plague on board, a history of a fatal case of plague occurring en route, the occurrence of 16 deaths on board up to May 6, and the subsequent escape of more than 100 contacts landed from the *Kishenev* under inadequate quarantine facilities, the consular representatives of foreign governments at Chefoo recommended, under date of May 28, 1921, the immediate establishment of adequate quarantine facilities at Chefoo.

JAMAICA.

Infectious Disease (Alastrim or Kaffir Pox).

During the week ended July 16, 1921, 212 new cases of alastrim or Kaffir pox were reported in the island of Jamaica.

Typhoid Fever—Kingston and Vicinity.

During the week ended July 16, 1921, 6 new cases of typhoid fever were reported in Kingston and 29 cases were reported in the surrounding country.

MEXICO.

Plague—Human Cases—Rodent Cases—Tampico.

During the week ended August 7, 1921, one case of plague was reported at Tampico, Mexico, and four deaths in previously reported cases. During the same period 20 plague-infected rats were found out of 2,200 rats taken.

¹Public Health Reports, July 1, 1921, p. 1534, and July 15, 1921, p. 1655.

Yellow Fever—Tampico.

During the week ended July 17, 1921, three cases of yellow fever with two deaths were reported at Tampico.

PERU.**Plague—Yellow Fever.¹**

June 16–30, 1921: During the period from June 16 to 30, 1921, 1 case of plague was reported at Callao, Peru, and at Lima 3 cases with 1 death were reported.

During the period under report 11 cases of yellow fever with 4 deaths were reported in Peru, occurring in two localities of the Department of Libertad, as follows: Pacanga, 1 case with 1 death; Paijan, 10 cases with 3 deaths.

July 1–15, 1921: During the period July 1 to 15, 1921, plague was reported in Peru in the departments of Arequipa, Callao, and Lima, as follows: Department of Arequipa, 2 cases occurring at Mollendo; Department of Callao, 5 cases with 1 death occurring at Callao; Department of Lima, 2 cases with 2 deaths occurring at Lima City.

During the period under report 2 cases of yellow fever were reported in the Department of Libertad, 1 case being reported at Pacasmayo and 1 case at Paijan.

SIAM.**Mortality—Year Ended March 31, 1921.**

During the year ended March 31, 1921, a total of 10,829 deaths was reported at Bangkok, Siam, representing a rate of 33.4 per 1,000 of population (population, 324,425). Mortality from cholera, plague, and smallpox, the only diseases stated to be reportable at Bangkok, was as follows: Cholera, 560; plague, 25; smallpox, 2. The death rate among infants and children was stated to have been very high on account of unfavorable environment and lack of knowledge of hygiene among the people.

UNION OF SOUTH AFRICA.**Influenza.**

Outbreaks of influenza were reported at Port Elizabeth, Somerset East, and other localities in the Cape Province, Union of South Africa, during the week ended June 4, 1921. The disease was stated to be mild in form except at Somerset East, where more than 100 cases, some being of the pneumonic form, were reported.

At Uitenhage, Cape Province, 20 cases of pneumonic influenza with 7 deaths were reported during the period from May 1 to June 25, 1921.

¹Public Health Reports, July 29, 1921, p. 1783.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER.**Reports Received During Week Ended Aug. 19, 1921.¹****CHOLERA.**

Place.	Date.	Cases.	Deaths.	Remarks.
India.....				May 8-14, 1921: Deaths, 4,628.
Bombay.....	June 12-18.....	6	6	
Madras.....	June 26-July 2.....	2		
Philippine Islands:				
Manila.....	June 19-25.....	2		
Straits Settlements:				
Singapore.....	June 12-18.....	1	1	

PLAGUE.

Algeria:				
Aumale district.....	May 31-July 3.....	71	22	Native district about 140 kilometers from Algiers.
India.....				June 12-18, 1921: Cases, 161; deaths, 128.
Bombay.....	June 5-18.....	20	15	
Karachi.....	June 26-July 2.....	1	1	
Madras Presidency.....	do.....	12	9	
Rangoon.....	June 5-11.....	13	9	
Mexico:				
Tampico.....	Aug. 1-7.....	1	4	Aug. 1-7, 1921: Plague rats found, 20.
Peru.....				June 16-30, 1921: Cases, 4; deaths, 1. July 1-15, 1921: Cases, 9; deaths, 3.
Callao.....	June 16-30.....	1		
Do.....	July 1-15.....	5	1	
Lima City.....	June 16-30.....	3	1	
Do.....	July 1-15.....	2	2	
Mollendo.....	do.....	2		Department of Arequipa.
Straits Settlements:				
Singapore.....	June 12-18.....		1	
Syria:				
Alexandretta.....	July 10-16.....	16	4	

SMALLPOX.

Canada:				
Manitoba—				
Winnipeg.....	June 19-25.....	1		
Do.....	June 26-July 16.....	3		
Ontario—				
Ottawa.....	July 24-30.....	5		
China:				Present.
Foochow.....	June 19-25.....			
Tientsin.....	do.....	5		
Do.....	June 26-July 2.....	5		
Colombia:				
Santa Marta.....	July 17-23.....			Do.
Cuba:				
Antilla.....	do.....	14		
India.....				May 8-14, 1921: Deaths, 430.
Bombay.....	June 5-18.....	30	17	
Karachi.....	June 26-July 2.....	2	2	
Madras.....	do.....	7		
Java:				
West Java—				
Batavia.....	June 10-16.....	1	2	
Buitenzorg.....	do.....	4		
Krawang.....	do.....	1		
Switzerland:				
Zurich.....	July 3-9.....	9		
Union of South Africa:				Outbreaks.
Cape Province.....	May 29-June 4.....			Do.
Natal.....	June 12-18.....			Do.
Orange Free State.....	May 29-June 18.....			Do.
Transvaal.....	do.....			Do.

¹ From medical officers of the Public Health Service, American consuls, and other sources.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.**Reports Received During Week Ended Aug. 19, 1921—Continued.****TYPHUS FEVER.**

Place.	Date.	Cases.	Deaths.	Remarks.
Algeria:				
Oran.....	July 10-20.....	7	7	
Chile:				
Valparaiso.....	June 26-July 2.....		2	
Egypt:				
Alexandria.....	July 9-15.....	2	1	
Mesopotamia:				
Bagdad.....	May 1-31.....	1	3	
Portugal:				
Oporto.....	July 12-18.....	1		
Russia:				
Latvia.....	May 1-31.....	208		
Union of South Africa:				
Cape Province.....	May 29-June 18.....			Outbreaks.
Venezuela:				
Maracaibo.....	June 21-27.....		1	

YELLOW FEVER.

Mexico:				
Tampico.....	July 11-17.....	3	2	
Peru:				June 16-30, 1921: Cases, 11; deaths, 4. July 1-15, 1921: Cases, 2.
Department—				
Libertad—				
Pacasmayo.....	July 1-15.....	1		
Pacanga.....	June 16-30.....	1	1	
Pailan.....	do.....	10	3	
Do.....	July 1-15.....	1		

Reports Received from July 2 to Aug. 12, 1921.**CHOLERA.**

Place.	Date.	Cases.	Deaths.	Remarks.
India:				
Bombay.....	May 1-June 4.....	5	4	Mar. 6-May 7, 1921: Deaths, 24,690.
Calcutta.....	May 8-June 18.....	512	445	
Madras.....	May 15-June 25.....	3	2	
Rangoon.....	Apr. 24-June 4.....	15	14	
Indo-China:				Jan. 1-31, 1921: Cases, 80; deaths, 15. May 29-June 12, 1921: Cases, 251; deaths, 202.
City—				
Cholon.....	June 6-12.....	5	4	
Saigon.....	May 9-June 12.....	65	44	
Provinces—				
Anam.....	Jan. 1-31.....	42		In January, 1920: No cases.
Cambodia.....	do.....	8	2	January, 1920: Cases, 27; deaths, 14.
Cochin-China.....	do.....	18	9	January, 1920: Cases, 13; deaths, 10.
Tonkin.....	do.....	12	4	January, 1920: No cases.
Philippine Islands:				
Manila.....	May 22-June 18.....	2		
Province—				
Batangas.....	June 12-18.....	2	1	
Pampanga.....	June 5-11.....	1	1	
Poland:				
Bialystok.....	July 25.....			Present.
Pinsk.....	do.....			Do.
Siam:				
Bangkok.....	Apr. 24-June 4.....	18	4	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from July 2 to Aug. 12, 1921—Continued.

PLAGUE.

Place.	Date.	Cases.	Deaths.	Remarks.
Asia Minor:				
Smyrna.....	June 19-25.....	1		In suburb.
Brazil:				
Bahia.....	May 15-28.....	2	1	
Maranhao.....	June 28.....	1	1	
British East Africa:				
Kenya Colony—				
Kisumu.....	Apr. 24-May 21.....			Present.
Ceylon:				
Colombo.....	May 8-June 11.....	2	2	
China:				
Amoy.....	May 15-June 25.....	7	2	
Foochow.....	May 15-21.....			Do.
Hongkong.....	Apr. 24-June 25.....	81	69	May 1-7, 1921: Plague rat found.
Manchuria—				
Harbin.....	May 3-22.....	46		
Ecuador:				
Guayaquil.....	May 1-June 15.....	10	1	
Egypt:				
Cities—				
Alexandria.....	May 21-June 24.....	10	3	Jan. 1-June 30, 1921: Cases, 176; deaths, 78.
Port Said.....	June 16-27.....	4	2	
Suez.....	May 20-June 30.....	9	5	One case pneumonic.
Provinces—				
Assiout.....	May 24-June 16.....	9	7	One case septicemic.
Gharbieh.....	June 2-25.....	7		
Minieh.....	May 28-June 10.....	2	1	
Hawaii:				
Panahan.....	May 21.....	1		
India:				
Bombay.....	May 1-June 4.....	260	182	May 1-June 11, 1921: Cases, 1,742; deaths, 1,343.
Calcutta.....	May 8-June 18.....	11	11	
Karachi.....	May 8-June 25.....	18	14	
Madras Presidency.....	May 22-June 25.....	112	72	
Rangoon.....	Apr. 24-June 4.....	71	66	
Indo-China.....				Jan. 1-31, 1921: Cases, 57; deaths, 51.
Saigon.....	May 23-June 12.....	4	1	May 8-15, 1921: 1 plague rat.
Madagascar:				
Tananarive.....	July 11.....			Present.
Mesopotamia:				
Bagdad.....	Apr. 1-30.....	5	2	
Mexico:				
Tampico.....	June 11-30.....	36		
Do.....	July 1-31.....	19	3	Infected rodents found, July 1-31, 1921: 71.
Peru.....				Mar. 1-31, 1921: Cases, 76; deaths, 44. Apr. 1-30, 1921: Cases, 43; deaths, 20. June 1-15, 1921: Cases, 10; deaths, 9.
Department—				
Arequipa.....	Mar. 1-31.....	2		At Mollendo.
Callao.....	do.....	7	1	At Callao.
Lambayeque.....	do.....	2	1	At Chiclayo.
Libertad.....	do.....	12	7	In 5 localities.
Lima.....	do.....	32	16	At Lima city, 20 cases, 13 deaths.
Piura.....	do.....	21	19	At Payta, Piura, and Sullana.
Ancachs.....	Apr. 1-30.....	4	1	At Huaramey.
Arequipa.....	do.....	3	3	At Mollendo.
Callao.....	do.....	8		At Callao.
Lambayeque.....	do.....	1	1	At Chiclayo.
Libertad.....	do.....	16	5	In 5 localities.
Lima.....	do.....	6	3	In Lima city, 3 cases, 1 death.
Piura.....	do.....	5	7	At Payta, Sullana, and Talara.
Libertad—				
Salaverry.....	June 1-15.....	1		
Trujillo.....	do.....	2	3	
Lima—				
Lima.....	do.....	2	3	
Piura—				
Piura.....	do.....	1		
Talara.....	do.....	4	3	
Porto Rico:				
Manati.....	July 17-23.....	1	1	Total plague-infected rats found from beginning of outbreak to July 9, 1921: 90.
Martin Pena.....	July 3-9.....	1		Suburb coextensive with San-turca.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from July 2 to Aug. 12, 1921—Continued.

PLAGUE—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Russia:				
Siberia—				
Vladivostok.....	May 1-31.....	141	145	
Senegal:				
Dakar.....	do.....	5	5	
Do.....	June 26-July 2....	49	42	
Siam:				
Bangkok.....	Apr. 24-June 4....	4	3	
Straits Settlements:				
Singapore.....	May 8-June 11....	5	4	
Syria:				
Beirut.....	May 31-June 10....	1		
On vessels:				
S. S. Kishenev.....	May 2.....	1		At Chefoo, China. Plague deaths en route. Vessel sent to quarantine. Kentucky Island, where to May 6 a total of 16 deaths was reported. (Public Health Reports, July 1, 1921, p. 1534.)
S. S. Oreland.....				At Genoa, Italy, June 12, 1921, from La Plata, Argentina. Two fatal cases plague in crew en route.
S. S. Ralph Moller.....	June 8.....	4	1	At Chefoo, China, from Vladivostok, Siberia. Three fatal cases en route. One case with fatal termination removed at Vladivostok.
S. S. Tenyo Maru.....				En route between Nagasaki and Kobe, Japan, June 28, 1921, 1 fatal case.

SMALLPOX.

Algeria:				
Algiers.....	May 1-June 30....	3		
Asia Minor:				
Smyrna.....	May 22-28.....	1		On the s. s. Nicholas.
Australia:				
Victoria—				
Geelong.....	May 5.....	1		Mild.
Melbourne.....	Apr. 9-23.....	4	1	Mild epidemic.
Bolivia:				
La Paz.....	Apr. 1-30.....	5	4	
Brazil:				
Pernambuco.....	Mar. 28-May 22....	28	4	
Rio de Janeiro.....	May 8-June 18....	11	2	
British East Africa:				
Kenya Colony—				
Zanzibar.....	May 8-14.....	12	4	Origin India.
Bulgaria:				
Sofia.....	May 15-31.....	6		
Canada:				
Alberta—				
Calgary.....	May 26-June 18....	3		
British Columbia—				
Vancouver.....	May 28-June 11....	5		
Manitoba—				
Winnipeg.....	May 28-June 18....	5		
New Brunswick—				
Charlotte County.....	July 10-16.....	7		
Restigouche County.....	June 19-25.....	1		
Westmoreland County.....	June 26-July 2....	2		
Nova Scotia—				
Sydney.....	June 5-18.....	2		
Do.....	June 26-July 2....	4		
Ontario—				
Hamilton.....	June 12-18.....	3		
Do.....	July 3-9.....	1		
Kingston.....	June 5-11.....	1		
London.....	June 5-25.....	2		
Montreal.....	June 12-18.....	1		
Do.....	July 17-23.....	1		
North Bay.....	June 11-25.....	3		
Do.....	June 26-July 9....	2		At two localities in vicinity, 2 cases.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from July 2 to Aug. 12, 1921—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Canada—Continued.				
Ontario—Continued.				
Ottawa.....	June 12-25.....	21		
Do.....	June 26-July 16.....	28		
Toronto.....	June 12-25.....	5		
Do.....	June 26-July 2.....	3		
Saskatchewan—				
Regina.....	June 5-25.....	3		
Do.....	July 10-16.....	3		
Saskatoon.....	June 7-27.....	3		
Chile:				
Antofagasta.....	May 16-June 19.....	228	106	
Arica.....	May 31.....	2		
Mejillones.....	May 30-June 5.....			Present. Also at interior nitrate plants.
China:				
Amoy.....	May 8-June 4.....		4	June 5-25: Present.
Antung.....	May 16-June 26.....	12	2	
Canton.....	Apr. 1-30.....			Present.
Chungking.....	May 1-June 25.....			Do.
Foochow.....	May 8-June 11.....			Do.
Hankow.....	May 15-21.....	4	1	
Hongkong.....	Apr. 24-June 25.....	99	84	
Manchuria—				
Dairen.....	May 9-June 19.....	39	4	
Harbin.....	May 16-June 13.....	5		
Mukden.....	May 22-June 11.....			Do.
Do.....	July 3-9.....			Do.
Nanking.....	May 8-June 18.....			Do.
Shanghai.....	June 20-26.....	1		
Tientsin.....	May 8-June 11.....	26		Mission hospital.
Tsingtau.....	May 9-June 12.....	4	1	
Chosen (Korea):				
Chemulpo.....	May 1-31.....	7	2	
Pusan.....	do.....	11	3	
Gensan.....	do.....	5	2	
Seoul.....	do.....	1		
Colombia:				
Santa Marta.....	June 5-25.....			Present.
Do.....	June 26-July 16.....			Do.
Cuba:				
Antilla.....	June 5-25.....	7		
Do.....	June 26-July 16.....	29		
Cienfuegos.....	do.....	1		
Matanzas.....	June 12-18.....	1	1	
Do.....	July 3-9.....	1		
Nuevitas.....	July 4-10.....	6		
Santiago.....	June 1-30.....	28	2	
Do.....	July 1-10.....	9	1	
Ecuador:				
Guayaquil.....	May 1-June 15.....	30		
Egypt:				
Cairo.....	Mar. 19-Apr. 29.....	2	1	
Port Said.....	Apr. 2-May 20.....	19		
Finland.....	May 1-15.....	1		
France:				
Brest.....	May 22-June 4.....	18		
Rouen.....	May 1-29.....	2		
Germany.....				Apr. 24-May 28, 1921: Cases, 12. Additional, Apr. 17-May 7, 1921: Cases, 57; deaths, 7.
Great Britain:				
Nottingham.....	May 29-June 4.....	1		
Southampton.....	June 26-July 2.....	1		
Greece:				
Saloniki.....	June 6-12.....		1	
Haiti:				
Cape Haitien.....	June 19-25.....	24	2	
Do.....	June 26-July 16.....	49	2	
India:				Mar. 20-May 7, 1921: Deaths, 2,464.
Bombay.....	May 1-June 4.....	49	29	
Calcutta.....	May 8-June 11.....	7	7	
Karachi.....	May 29-June 25.....	25	17	
Madras.....	May 8-June 25.....	33	11	
Rangoon.....	Apr. 24-June 4.....	20	8	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from July 2 to Aug. 12, 1921—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Indo-China.....				Jan. 1-31, 1921: Cases, 102; deaths, 15.
City—				
Saigon.....	May 9-15.....	2	1	
Provinces—				
Anam.....	Jan. 1-31.....	35	3	January, 1920: Cases, 16; deaths, 3.
Cambodia.....	do.....	21	3	January, 1920: Cases, 139; deaths, 54.
Cochin-China.....	do.....	19	12	January, 1920: Cases, 8; deaths, 1.
Tonkin.....	do.....	27		January, 1920: Cases, 224; deaths, 43.
Italy:				Province: June 6-20, 1921: Cases, 5.
Catania.....				
Genoa.....	Apr. 1-May 31.....	11		
Messina.....	May 23-June 26.....	2	1	
Palermo.....	May 18-June 14.....	6	1	
Milan.....	Apr. 1-30.....	2		
Japan:				
Kobe.....	May 24-June 26.....	3		
Nagasaki.....	May 23-June 26.....	6	1	
Java:				
West Java—				
Bandoeng.....	May 27-June 3.....	1		
Batavia.....	May 6-June 9.....	10	7	
Buitenzorg.....	Apr. 29-June 9.....	11		
Garoet.....	May 6-12.....	1		
Krawang.....	Apr. 29-June 5.....	28	2	
Lebak.....	Apr. 29-May 26.....	12	2	
Pandeglang.....	June 5-9.....	1		
Jugoslavia.....				May 7-13, 1921: Cases, 83; deaths, 20.
Mesopotamia:				
Bagdad.....	Apr. 1-30.....	3	1	
Mexico:				
Tampico.....	July 11-20.....	1		
Chihuahua.....	May 23-June 27.....		3	
Mexico City.....	May 15-June 25.....	246		
Do.....	June 26-July 2.....	25		
San Luis Potosi.....	July 17-23.....		1	
Vera Cruz.....	July 13-19.....		1	
Do.....	July 11-17.....		1	
Panama.....				Jan. 1-June 10, 1921: Cases, 192; of which 32 were nonresidents.
Canal Zone.....	Jan. 1-June 10.....	2		
Colon.....	do.....	111		
Panama.....	do.....	47		
Poland.....				Mar. 1-Apr. 30, 1921: Cases, 1,117; deaths, 142.
District—				
Bialystok.....	Mar. 1-Apr. 30.....	3		
Cracovia.....	do.....	56	6	
Kielce.....	do.....	180	26	
Leopol.....	do.....	32	16	
Lodz.....	do.....	72	9	
Lubin.....	do.....	397	30	
Posen.....	do.....	26	2	
Silesia.....	do.....	10		In Teschen.
Stanislawow.....	do.....	30	5	
Tarnopol.....	do.....	156	31	
Warsaw.....	do.....	36	4	
Warsaw City.....	do.....	90	13	
Portugal:				
Lisbon.....	May 15-June 18.....		32	
Oporto.....	June 19-23.....	1		
Portuguese East Africa:				
Lourenco Marques.....	May 8-23.....	8		
Rumania:				
District—				
Hotin.....	Apr. 1-30.....	40	9	
Orhei.....	Mar. 1-31.....	2		
Russia:				
Province—				
Esthonia.....	Apr. 1-30.....	6		
Latvia—				
Riga.....	do.....	26		
Senegal:				
Dakar.....	May 1-31.....	1	1	
Spain:				
Barcelona.....	May 12-June 22.....		13	
Malaga.....	May 1-31.....		34	
Tarragona.....	May 9-15.....		1	
Valencia.....	May 22-28.....	1		
Do.....	July 2-9.....	5		

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from July 2 to Aug. 12, 1921—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Switzerland:				
Zurich.....	May 28-June 11...	10		
Syria:				
Aleppo.....	Apr. 9-16.....			Present.
Beirut.....	May 10-30.....	1	1	
Tunis:				
Tunis.....	May 30-June 17...	2	3	
Do.....	July 2-8.....	1	2	
Turkey:				
Constantinople.....	June 12-25.....	5		
Do.....	June 26-July 2....	6		
Union of South Africa:				
Cape Province.....	Apr. 24-May 7.....			Outbreaks.
Natal.....	do.....			Do.
Orange Free State.....	do.....			Do.
Transvaal.....	May 22-28.....			Do.

TYPHUS FEVER.

Algeria:				
Algiers.....	May 1-June 30....	109	25	
Oran.....	May 22-June 30....	41	30	
Asia Minor:				
Smyrna.....	June 12-18.....	1		In district.
Bolivia:				
La Paz.....	Apr. 1-30.....	32	39	
Brazil:				
Porto Alegre.....	June 19-25.....		3	
Chile:				
Concepcion.....	Apr. 12-June 20....		8	
Valparaiso.....	Mar. 27-May 28....		4	
China:				
Antung.....	May 30-June 5....	1		
Hankow.....	May 22-June 11....	3		
Manchuria—				
Harbin.....	May 23-29.....	1		
Chosen (Korea):				
Fusan.....	May 1-31.....	1		
Gensan.....	do.....	2		
Seoul.....	do.....	1		
Czechoslovakia:				
Prague.....	June 5-26.....	5	2	
Egypt:				
Alexandria.....	May 21-June 23....	21	8	
Do.....	June 24-July 1....	8	3	
Cairo.....	Mar. 19-May 6....	94	39	
Port Said.....	Apr. 2-May 13....	8	2	
Finland.....	May 1-15.....	5		
Germany.....				Apr. 24-June 4, 1921: Cases, 7.
Hamburg.....	May 27-June 4....	1		
Great Britain:				
Dublin.....	May 29-June 4....	1		
Greece:				
Saloniki.....	May 23-June 26....	21	6	
Do.....	June 27-July 3....	1		
Japan:				
Nagasaki.....	May 23-June 5....	7	2	
Jugoslavia:				
Belgrade.....	May 1-14.....	6		Jan. 30-Mar. 13, 1921: Cases, 109; deaths, 15.
Zagreb.....	June 19-25.....	3		
Mexico:				
Mexico City.....	May 15-June 25....	102		Including municipalities in Federal district.
Do.....	June 26-July 2....	29		Mar. 1-Apr. 30, 1921: Cases, 11,489; deaths, 1,131.
Poland:				
District—				
Bialystok.....	Mar. 1-Apr. 30....	853	45	
Cracovia.....	do.....	603	90	
Kielce.....	do.....	848	62	
Leopol.....	do.....	2,508	277	
Lodz.....	do.....	521	53	
Lublin.....	do.....	1,446	83	
Posen.....	do.....	77	5	
Silesia.....	do.....	26		In Teschen.
Stanislawow.....	do.....	1,557	232	
Tarnopol.....	do.....	1,855	194	
Warsaw.....	do.....	972	61	
Warsaw city.....	do.....	223	29	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.**Reports Received from July 2 to Aug. 12, 1921—Continued.****TYPHUS FEVER—Continued.**

Place.	Date.	Cases.	Deaths.	Remarks.
Rumania:				
District—				
Hotin.....	Apr. 1-30.....	107	10	
Orhei.....	Mar. 1-31.....	80		
Russia:				
Province—				
Estonia.....	Apr. 1-May 31....	98		
Latvia.....	Apr. 1-30.....	209		
Siberia—				
Vladivostok.....	Mar. 1-May 31....	5	2	
Spain:				
Madrid.....	May 1-31.....		1	
Syria:				
Beirut.....	May 20-June 10...	1	1	
Tunis:				
Tunis.....	June 11-17.....		3	
Turkey:				
Constantinople.....	May 22-June 18...	11		
Do.....	June 26-July 9....	7		
Union of South Africa:				
Cape Province.....				Apr. 24-May 28, 1921: Outbreaks.
Capetown.....	May 13-19.....	10	3	At native cantonment in vicinity.
East London.....	May 22-28.....		1	
Orange Free State.....				Apr. 24-May 28, 1921: Outbreaks.

YELLOW FEVER.

Mexico:				
Alamo.....	June 1-30.....	10		State of Vera Cruz.
Vera Cruz.....	June 13-27.....	7		
Peru:				Mar. 1-31, 1921: Cases, 66; deaths, 25. Apr. 1-30, 1921: Cases, 106; deaths, 32. In 13 localities.
Department—				
Lambayeque—				
Chiclayo.....	Mar. 1-31.....	20	10	
Chongollape.....	do.....	2	2	
Ferrenafe.....	do.....		1	
Lambayeque.....	do.....	15	5	
Monsefu.....	do.....	18	4	
Motupe.....	do.....	1	1	
Pomalca.....	do.....	5	1	
Villa Eten.....	do.....	5	1	
Callao—				
Callao.....	Apr. 1-30.....	1		At quarantine station. From Chiclayo.
Lambayeque—				
Chiclayo.....	do.....	23	5	
Chongollape.....	do.....	10	1	
Jayanca.....	do.....	5	2	
Lambayeque.....	do.....	5	2	
Monsefu.....	do.....	8	5	
Motupe.....	do.....	45	11	
Oimos.....	do.....	2	4	
Villa Eten.....	do.....	2		
Zana.....	do.....	1		
Libertad—				
Guadalupe.....	do.....	2		
Pueblo Nuevo.....	do.....	1	1	
Trujillo.....	do.....	1	1	Country.
Lambayeque—				
Chiclayo.....	June 1-15.....	4	3	
Monsefu.....	do.....	3		
Pacora.....	do.....	1		
Libertad—				
Casa Grande.....	do.....	1		Farm.
Pacanga.....	do.....	1		
Paljan.....	do.....	3	4	
Trujillo.....	do.....	1	1	